AVIATION WEEK

50 CENTS

A story that can now be told

The cylinder you see here in cutaway should soon be causing a lot of excitement, now that we're permitted to take the security wraps off.

Its name is the Hermetic Integrating Gyro, HIG for short. It is the world's most sensitive gyro. To date we've made over 10,000 of these amazing gyros. Based on an M.I.T. design, their moving parts rotate in a fluid on a gimbal that is jewel-mounted.

Because of this nearly frictionless mounting, the HIG (length 6", diameter 2.75", weight 3#) can detect such things as the rotation of the earth, or a speed 1/100th that of the hour hand on a watch. And it's so rugged it can do such precision jobs even after being used as a hammer to drive a nail.

Up to now, major uses of the HIG have been in pilotless missile guidance systems and in radar stabilization. You may have a very different application of the HIG in mind. If so, we'd like to hear from you. We'll be glad to send full details—on the HIG, and on our full gyro line as well.

Besides the HIG, Honeywell, a leader in gyro production, manufactures a complete family of Vertical Gyros, Cageable Vertical Gyros, damped and undamped Rate Gyros which is now available on a mass production basis to industry.

The Honeywell gyro "family" is an important part of our complete line of aeronautical controls. We're continually working to improve it because automatic control is important to aviation's progress. And *automatic control* is Honeywell's business.

MINNEAPOLIS **Honeywell**

Aeronautical Controls

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2600 Ridgway Road, Minneapolis 13, Minn.

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What's so **DIFFERENT**

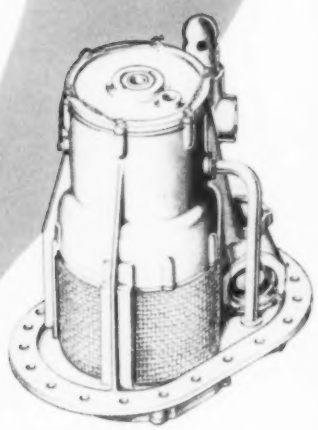
about **HY-V/L*** Fuel Booster Pumps ?

It's not the pump—it's the principle!

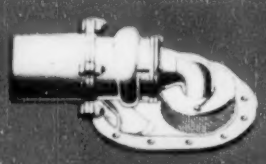
Other fuel booster pumps attempt to separate the vapor from boiling fuel. The HY-$^{V}/_{L}$ principle, developed by Hydro-Aire, is to take both vapor and liquid together and condense the vapor back into the liquid *inside the pump.*

In other words, the HY-$^{V}/_{L}$ Pump is more efficient. It saves the extra power needed to drive a separator.

That is why, in tests sea-level to 70,000 feet, the HY-$^{V}/_{L}$ pumps more fuel at more pressure with less power consumption. HY-$^{V}/_{L}$ Pumps have been tested at rates of climb far in excess of aircraft performance for years to come. In addition, HY-$^{V}/_{L}$ Pumps have the power of immediate recovery both after temporary power failure and after being completely uncovered at the inlet.



High Capacity A.C. Electric Motor Driven Submerged Fuel Booster Pump. Output: 40,000 lb. per hour at 14 psig discharge pressure.



HYDRO-AIRE INC.

3000 Winona Avenue, Burbank, Calif.

Subsidiary of Crane Co.

Submerged D.C. Electric Motor Driven tank mounted Fuel Booster Pump. This Pump will deliver 6,000 lb. per hour of Aviation Fuel at 4 psig discharge pressure.

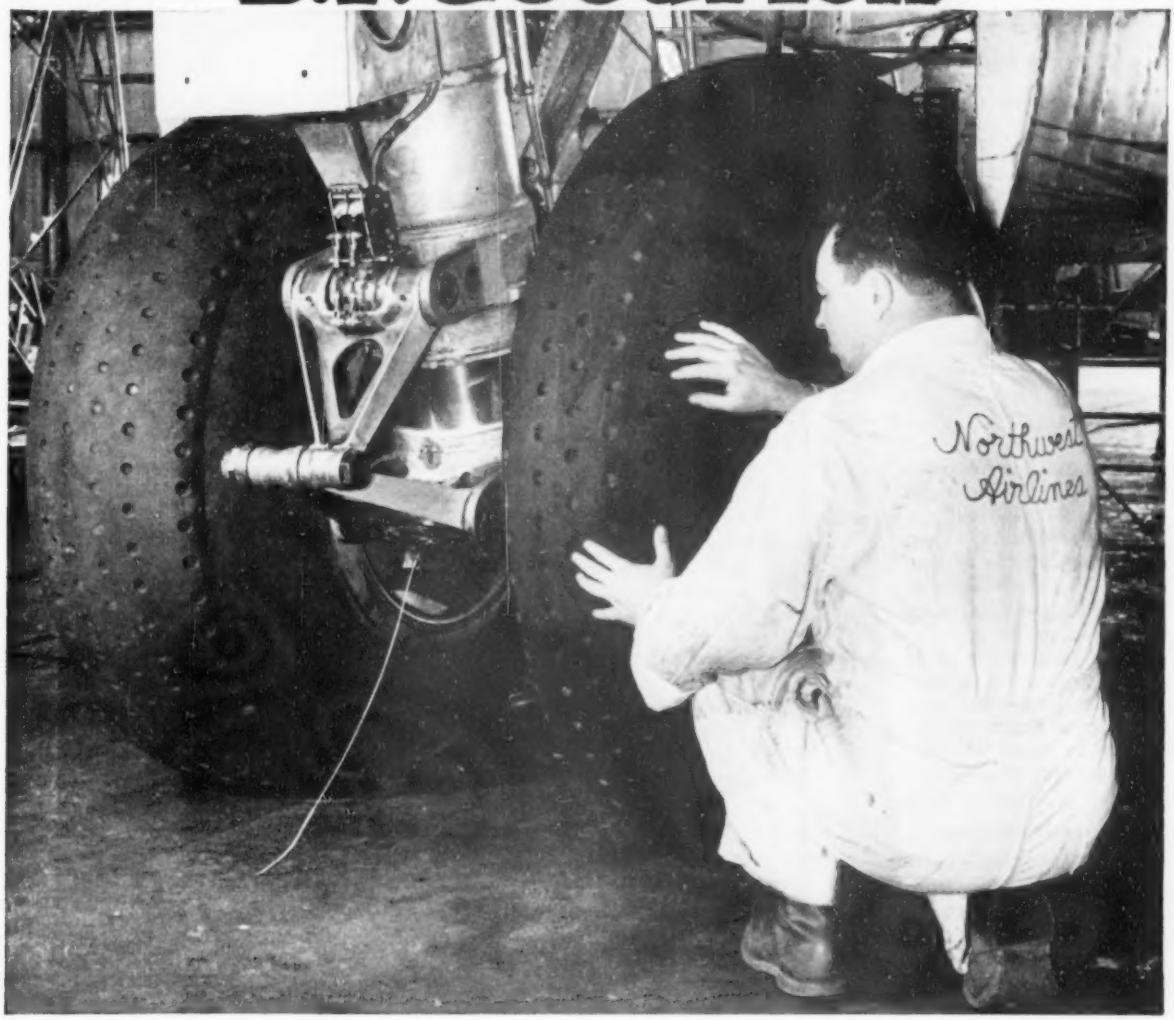
Submerged A.C. Electric Motor Driven Fuel Booster Pump. Supplies 20,000 lb. per hour of Aviation Fuel at 6 psig discharge pressure.

*High Vapor/Liquid Ratio

Engine-driven, line-mounted Fuel Booster Pump. Delivers 23,000 lb. per hour Aviation Gasoline at 10 psig discharge pressure. 12,000 rpm Shaft Speed.

EVERY FIGHTER, EVERY BOMBER, EVERY TRANSPORT IS HYDRO-AIRE EQUIPPED

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



"20% more landings with Dimpled Tire"–says Northwest

"TWO YEARS of service proves the new B. F. Goodrich Dimpled Tire gives 20% more landings than all others," reports Northwest Orient Airlines. That's one reason why economy-minded Northwest officials have made the Dimpled Tire standard equipment on all DC-4's and Stratocruisers.

The B. F. Goodrich Dimpled Tire combines a new tread and long-lasting cord body that gives more wear and a higher number of retreads. Its dimpled tread provides better distribution of the tire load—greater protection against tread cutting and carcass damage.

A complete departure from conventional ribbed tread tire design, the new B. F. Goodrich Dimpled Tire has been adopted by 24 major airlines as standard equipment. One of these reports up to 27% more landings.

B. F. Goodrich is now producing the new Dimpled Tire in all popular airline sizes. And like the recently announced Tubeless Tire for combat jets, it's another first from B. F. Goodrich, leader in rubber research and engineering.

Other B. F. Goodrich products for aviation include wheels and brakes, De-Icers, heated rubber, Pressure Sealing Zippers, inflatable seals, fuel cells, Rivnuts, accessories. *The B. F. Goodrich Co., Aeronautical Sales, Akron, Ohio.*

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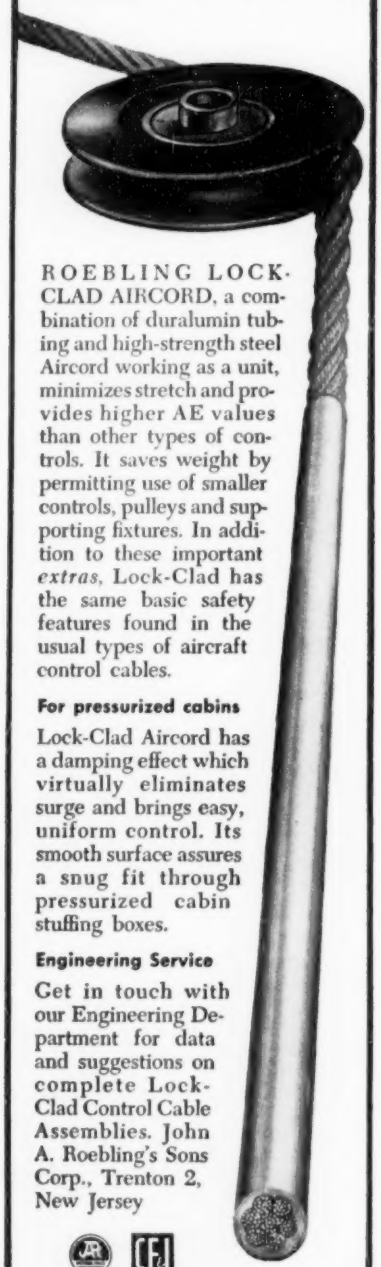
FIRST IN RUBBER

AIRCORD

Roebling Lock-Clad assures highest efficiency and safety



ROEBLING LOCK-CLAD AIRCORD, a combination of duralumin tubing and high-strength steel Aircord working as a unit, minimizes stretch and provides higher AE values than other types of controls. It saves weight by permitting use of smaller controls, pulleys and supporting fixtures. In addition to these important *extras*, Lock-Clad has the same basic safety features found in the usual types of aircraft control cables.

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Lock-Clad Aircord has a damping effect which virtually eliminates surge and brings easy, uniform control. Its smooth surface assures a snug fit through pressurized cabin stuffing boxes.

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Get in touch with our Engineering Department for data and suggestions on complete Lock-Clad Control Cable Assemblies. John A. Roebling's Sons Corp., Trenton 2, New Jersey

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Aviation Week

May 3, 1954 Vol. 60, No. 18

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Table of Contents on Page 8

51,331 copies of this issue printed

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GCA RADAR AND ELECTRONICS
Gilfillan
LOS ANGELES
GCA
AROUND THE WORLD

QUESTIONS AND ANSWERS ABOUT GILFILLAN

QUESTION: The name Gilfillan has become synonymous with GCA radar. Is GCA radar Gilfillan's main activity?

ANSWER: No. Gilfillan activities are highly diversified. The company is engaged in: aircraft components manufacture (since 1917); surveillance radar (1942); airborne radar (1944); radar trainers (1945); radar training schools (1946); automatic GCA radar (1947); automatic air traffic control radar (1949); radar countermeasures (1951); ground and air systems for guided missiles (1952); and additional classified projects in related fields since 1953.

QUESTION: Are Gilfillan contracts diversified?

ANSWER: Yes. Gilfillan is now fulfilling development and production contracts for the U. S. Air Force (Air Defense Command, Air Materiel Command, Strategic Air Command, Tactical Air Command); Army Ordnance; Army Signal Corps; U. S. Navy (Bureau of Aeronautics and Bureau of Ships); Royal Canadian Air Force; Royal Australian Air Force; South African Air Force; and for the governments of France and other NATO countries.

QUESTION: Is Gilfillan a World War II company?

ANSWER: No. Gilfillan has engaged in precision research, design and production of aircraft components and electronics equipment since 1912.

QUESTION: Is Gilfillan a small company?

ANSWER: No. Gilfillan has 7 plants, dispersed throughout Southern California.

QUESTION: Has Gilfillan a special reputation for efficiency and versatility?

ANSWER: Yes. Gilfillan has solved difficult electronics design and production problems in a wide range, from the smallest, lightest airborne radar and radar trainers to guidance systems for the largest and most complex guided missiles. Gilfillan has again and again succeeded in effecting great economies in size, weight and number of components, with an increase in efficiency and reduction in cost.

QUESTION: Are Gilfillan deliveries on schedule?

ANSWER: Yes. Gilfillan has an international reputation for dependable, on-schedule deliveries.

QUESTION: Can Gilfillan take on new projects at the present time?

ANSWER: Yes. Current and continuing Gilfillan expansion in equipment and production facilities permits Gilfillan to engage in new problems in related fields.

GILFILLAN, LOS ANGELES--GCA Radar and Electronics

Need a rugged chopper-inverter?

See Bristol's Syncroverter Switch*

Bristol Syncroverter Switches are non-resonant, wide-frequency, low noise-level, precision synchronous inverters or rectifiers, with two SPDT or one DPDT switching action.

A series of models is available, designed for optimum service under various operating conditions involving ambient temperatures of —55° to +100°C, and severe conditions of vibration and shock up to 500 cps and up to 50G. Standard contact rating: 0 to 3 volts, 2 ma resistive load. Voltages up to 150 v. can be handled under certain conditions.

EXCITATION REQUIREMENTS: 0.5 va or less with a-c up to 500 cycles. The Syncroverter will operate normally under sine wave, square wave, pulse, or special wave shape excitation currents; also applicable to plate circuit operation.

FREQUENCY: Operated on a-c of fixed or variable frequency: response up to 3500 cycles.

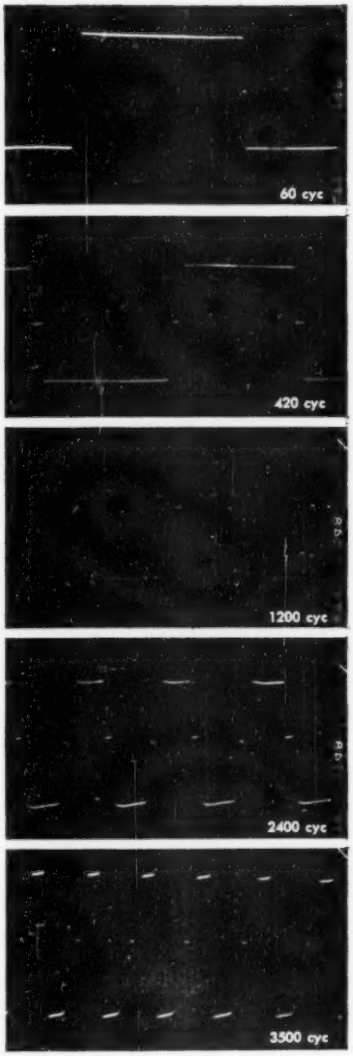
COIL DATA: Available with various coil impedances; also single or double coils for polar relay applications.

SERVICE LIFE: Life is dependent on operating frequency and loading. Typical rating: 1000 hours at 400 cycles.

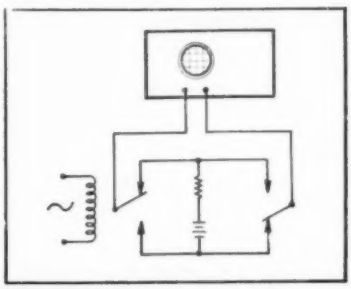
Bristol Syncroverter Switches are available with either "make-before-break" or "break-before-make" switching action. They are reliable in the microvolt and microampere ranges. Cases are hermetically sealed.

If you have an application requiring a high-quality synchronous rectifier or inverter, write to The Bristol Company, 130 Bristol Rd., Waterbury 20, Conn., outlining your requirements. We can help you.

*Trade Mark



OSCILLOSCOPE PATTERNS photographed during DPDT switching of a typical Syncroverter at various frequencies in circuit shown.



CIRCUIT of Syncroverter and Oscilloscope during the above test.

4.22

BRISTOL

FINE PRECISION INSTRUMENTS FOR OVER 60 YEARS

NEWS DIGEST

Domestic

Trans World Airlines pilots last week postponed a walkout called to protest removal of navigators on TWA's Mediterranean routes (AVIATION WEEK Apr. 26, p. 82), agreed to continue flight operations for 30 days with navigators who will occupy their regular stations but perform no duties unless necessary.

Rocket engines for the Corporal guided missile (AVIATION WEEK Apr. 26, p. 12) are rolling off assembly lines at Ryan Aeronautical Co.'s San Diego plant. The engine was designed by the jet propulsion laboratory of the California Institute of Technology.

Crash of an executive Grumman Mallard Jan. 10 near Shreveport, La., killing Braniff Airways president Thomas E. Braniff and 11 other persons, was caused partially by failure of a pilot in the area to report severe icing condition and by incomplete forecast information, Weather Bureau chief F. W. Reichelderfer says, in a report to Rep. Overton Brooks of Louisiana.

Aircraft Industries Assn. reports combined net earnings of the 12 largest U. S. airframe builders reached a peacetime high of $116.6 million in 1953, 65% of which was plowed back into the companies.

Indo-China airlift of French paratroopers by U. S. C-124s is being operated by USAF's 62nd Troop Carrier Wing on an "extended" basis, Pentagon sources reveal.

United Air Lines is conducting an economic study of possible fleetwide airborne radar installations on its DC-7s, DC-6s and Convair 340s, a company spokesman reports. Final decision, involving a $3.5-million expenditure, must be made by UAL's board and is at least a month off.

Keystone Helicopter Corp., Philadelphia's first air taxi, has started operations with Bell 47s.

Mohawk Airlines has taken delivery on a Sikorsky S-55 helicopter, plans to begin operating it on a certificated route June 7.

Brig. Gen. Don Z. Zimmerman has been appointed dean of faculty of the USAF Academy opening next year.

Ervin N. Townsend, 57, tactical division chief of CAB's Bureau of Safety Investigation, died Apr. 24 in Denver.

Dr. R. C. Briant, 52, chief of the Aircraft Nuclear Propulsion Project at Oak Ridge (Tenn.) National Laboratory, died Apr. 25 at his home in Oak Ridge.

Super Connie Flight Tests Turboprop

Installation of an Allison T56 turboprop engine (left) on Lockheed Aircraft Corp.'s Super Constellation "flying laboratory" is providing the company with experience on the powerplant prior to the first flight of its C-130 USAF transport, to be powered by four T56s. The Super Connie also is fitted with a duplicate of the C-130's control system and some of its main accessories. This is the original Constellation, modified continuously to keep pace with the transport's development. It has, in addition to the T56, a 3,250-hp. Wright Turbo Compound, two 2,700-hp. P&WA R2800-Cs.

Financial

Douglas Aircraft Co., Santa Monica, Calif., reports net earnings of $8,899,596 for the first quarter of fiscal 1954, more than double the $4,389,787 net for the same period last year. Sales totaled $240,867,145, compared with $231,622,619.

Glenn L. Martin Co., Baltimore, had a net income of $2,407,061 during the first quarter of this year, compared with $1,754,079 for the same period last year. Unaudited operating figures also show a 22% increase in sales, climbing from $29,718,415 last year to $36,313,391.

American Airlines' net profit for the first three months of 1954 totaled $446,224, compared with $1,888,499 for the first quarter of 1953. Revenue was $49,941,000, compared with $44,504,000. Principal reason for the lower profit: "reduction in load factor from 69.6% in 1953 to 63.4% in 1954, coupled with continuing increases in some of the principal elements of cost."

Beech Aircraft Corp., Wichita, has canceled its regular 25-cent dividend for the third consecutive quarter (AVIATION WEEK Jan. 25, p. 7), but reports net earning of $1,544,401 for the six months ended Mar. 31. Beech expects to resume dividend payments before the end of its present fiscal year operations.

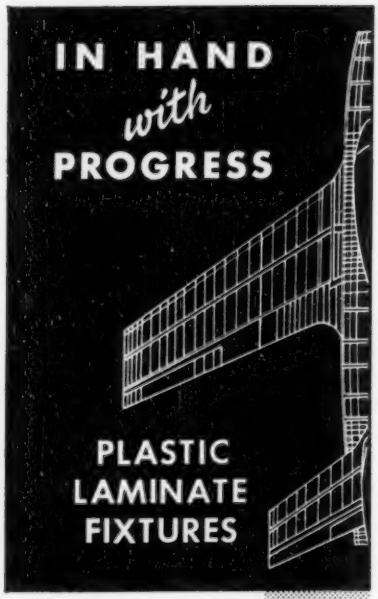
International

Comet production has been suspended by de Havilland. Short Brothers, who also are producing the jet transport, has discontinued its output. The action has been taken by de Havilland pending the result of investigation on the cause of the Apr. 8 crash. De Havilland slowed Comet output following the crash (AVIATION WEEK Apr. 26, p. 16).

Wreckage of an Argentine Airlines DC-3, missing since it crashed in a storm Apr. 23 on a domestic flight, was found last week in the Vilgo Mountains. All 25 persons aboard were killed.

Canadair has delivered its 1,000th F-86 Sabre to Royal Canadian Air Force.

Ansett Airways has ordered two Convair 340s, plans to take delivery on the first before the end of this year.



- LIGHT
- STABLE
- RIGID
- ACCURATE

Weight is always a factor in fixture design and use.

Weight which is added for structural support always means extra costs in man hours and handling time.

BERG — Its engineering and plastic division, stand ready to help you eliminate this problem. Laminated plastic fixtures are LIGHT, STABLE and RIGID.

For that "WEIGHTY PROBLEM" in fixtures, consult with BERG on plastic laminates as a solution.

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The Aviation Week

May 3, 1954

Headline News

ACC Urges Mergers, Subsidy Phaseout 12
Hibbard Outlines A-Plane Design..... 14
Doman, Fleet Form Copter Company.. 15
'55 Airpower Funds: $8.9 Billion..... 16
SEC Acts to Block Horton Stock Sales.. 17
CAB Blames Crews in Inflight Crash... 17
Steady Pace for Air Industry: Peale... 17
Stockholders Okay UAC-CV Separation 18
'Flying Saddle Horse' Starts Tests..... 21
TWA Plots Connie Flights on Jet Stream 23
Congress Wants AF to Buy Fewer Spares 25
Lear Sees 80,000 Planes by 1960..... 27
Civil Plane, Engine Shipments..... 28
Johnson Says CRAF Cuts Defense Costs 29

•

Aeronautical Engineering

NACA Studies F-102 Delta Model..... 30
RAF Valiant Shows Changes..... 36
British Test Robot Landing Aid..... 43

•

Production

Ford Beats J57 Delivery Schedule..... 44
Piasecki Builds Helicopters Faster..... 49

•

Avionics

SPAR GCA Is Light, Precise..... 54

•

Equipment

How UAL's Nerve Center Works..... 64

•

Air Transport

High Depreciation Seen for Jet Liners.. 75
PAA Answers Anti-Trust Suit..... 76
CAB Weighs New VFR Safety Tests.... 76
Colonial Merger 78
D.C. Plan Too Costly: Airlines..... 79

•

Editorials

Great Untapped Markets..... 90
Now They're Practically Here..... 90
Detroit's Charm of Quaintness..... 90
We Can't Afford a Soaring Team?..... 90

•

Departments

News Digest 7
Picture Page 9
Who's Where 11
Industry Observer 11
Thrust & Drag..... 43
Production Briefing 48
BuAer Contracts 50
Fast Writeoffs 50
Filter Center 62
New Aviation Products..... 70
Shortlines 80
News Sidelights 88
Aviation Calendar 88

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IN A RUGGED CARRYING CASE

Here is new lightweight equipment for ground or shipboard communication with aircraft, or other uses, such as air-ground operation in oil or mining prospecting. The set may be fastened in place in aircraft and connected to an aircraft antenna to supplement the airborne equipment already installed, for special work. The ARC Type 12 operates on a 24 volt power source – the only additional equipment required. 118-148 mc. Both transmitter and receiver are easily portable, in a rugged carrying case. Complete weight, packed, is only 37 lbs. With its sectionalized antenna, it can be set up and be on the-air in a few minutes.

Assembly consists of ARC Type R-19 Receiver and choice of Type T-11B or T-13A Transmitters, all widely used by Army, Navy and Air Force. Distance range is 50 to 100 miles with aircraft at 3,000 to 10,000 feet. Write for detailed description.

Dependable Airborne Electronic Equipment Since 1928

ARC Aircraft Radio Corp
BOONTON, NEW JERSEY

F9F-8 COUGAR differs from earlier Grumman F9F-6 (below, right) in its cambered leading edge wing extensions and extended trailing edges, increasing wing chord 15% and providing relatively thinner wing for higher speeds. Deletion of leading edge slats provides space for 30 gal. of extra fuel in each wing. F9F-8 is being phased into F9F-6 and F9F-7 lines at Bethpage, N. Y.

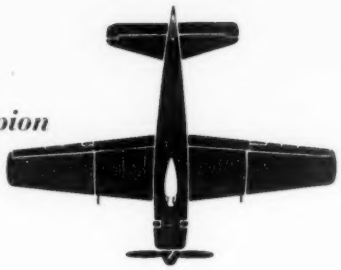
Grumman Produces New Model Cougar

F9F-6 COUGAR with wings folded shows straight-line leading edge, shorter wing fillet stopping well short of P&WA J48 exhaust. Note air-refueling nose probe.

F9F-8 COUGAR fuselage center section is eight inches longer than F9F-6, permitting additional 80 gal. of fuel to be carried and bringing total extra fuel to 140 gal. Cougar carries all fuel internally, although external tanks may be fitted to increase normal range.

Newest version of the

world's single-engine weight-lifting champion



the U.S. Navy's

Douglas AD-6 Skyraider

Few aircraft can rival the over-all record of the Douglas AD Skyraiders. Here is a piston-engine series that holds its own with honor in the jet age.

Now comes the newest version of Skyraider—the Douglas AD-6. A hint of its efficiency can be seen in the world record set by its predecessor, the AD-4, which recently took off with a useful load of 14,941 pounds—*three thousand pounds more than its own basic weight.* Most versatile planes in the air, the AD Skyraiders can handle 22 different assignments—a usefulness which will be extended even farther by the new AD-6.

Development of the AD-6 Skyraider is another example of Douglas leadership in aviation. The development of planes that can be produced in quantity—*to fly faster and farther with a bigger payload*—is the basic rule of Douglas design.

Be a naval flier—write to:
Nav Cad, Washington 25, D.C.

Depend on *DOUGLAS* First in Aviation

WHO'S WHERE

In the Front Office

Gen. John K. Cannon (USAF Ret.) has joined Fletcher Aviation Corp., Pasadena, Calif., as board chairman.

Bruce A. Coffin has been elected chairman of the board of Victoreen Instrument Co., Cleveland.

William Sorensen is new executive vice president of Kelite Products, Inc., Los Angeles; **R. C. Martin** has been promoted to vice president-sales and named a member of the board.

W. Kenneth Houpt has been promoted by Curtiss-Wright Corp. to vice president-sales of the Wright Aeronautical Division, Woodridge, N. J. Other new Wright Aeronautical vice presidents: **Nicholas Dystra**, controller; **Frank H. Hankins, Jr.**, service, and **Frank W. Mencik**, manufacturing.

G. E. Traumueller has been appointed treasurer of Lunn Laminates, Inc., Huntington Station, N. Y., and Ashtabula, Ohio.

Changes

Ernest W. Fuller, onetime staff engineering director for American Airlines, has become manager of REF Manufacturing Corp.'s new Poly-Plastics Division at Mineola, N. Y.

Frank W. Davis has moved up from assistant to Convair's vice president-engineering to chief engineer of the aircraft builder's Ft. Worth (Tex.) Division.

W. P. Bollinger has joined the missile section of Bendix Aviation Corp.'s Products Division, Mishawaka, Ind., as manager of weapon systems development. Other missile changes: **Dr. J. J. Martin**, new analysis group member; **G. E. Wiley**, manager of materials department.

Dirk J. Kooleman is new U.S. general manager for KLM Royal Dutch Airlines, succeeding **C. F. C. Meuser.**

Robert J. Pike has been promoted by Air Associates, Inc., Teterboro, N. J., to advertising manager.

Chester M. Weaver has been appointed manager of Boeing Airplane Co.'s flight test operation at Larson AFB, Wash.

Charles M. Mathews has been named purchasing agent for Braniff Airways.

Randall T. Holden has become cargo sales manager for Japan Air Lines.

Robert E. Morris is new chief of Jack & Heintz' field office in Seattle, Washington.

William F. Wilson has become works manager for Gear Grinding Machine Co., Detroit.

Honors and Elections

Montgomery R. Shafer of the National Bureau of Standards has received the Department of Commerce Silver Medal for Meritorious Service, awarded for "important original development of methods, instruments and equipment for determining the performance of aircraft carburetors and fuel control units." NBS staff members who received the Gold Medal Award for Exceptional Service in electronics: **J. G. Reid, Jr.; Robert L. Henry; Dr. Benjamin L. Davis; Charles C. Rayburn, James G. Black, Jr.,** and **Harold S. Horiuchi.**

INDUSTRY OBSERVER

► New idea for spin recovery is wingtip-mounted rockets fired by pilot to stop rotation of plane in spin. Flight tests have been completed successfully on North American T-28 and National Advisory Committee for Aeronautics has made model tests in spin tunnel.

► Cessna Aircraft Co.'s CH-1 helicopter and XT-37 trainer are scheduled to fly within next four months. Plan is to build three of the Continental-Marbore-powered trainers.

► USAF development program includes engines of almost 25,000 lb. thrust, according to Air Force Secretary Harold E. Talbott.

► North American's second TF-86 two-place trainer is scheduled for first flight in early July. First TF-86 was lost in a crash which took the life of test pilot Joseph Lynch (Aviation Week Mar. 29, p. 15).

► Donald W. Douglas, Jr., vice-president-military sales, has shown Douglas Aircraft Co. stockholders a model of the company's C-133 military transport —a large high-wing model powered by four turboprop engines—and said the company hopes to have a C-133 production contract "very soon."

► Production of 10,000 glass-plastic 225-gal. droppable fuel tanks is being started by Molded Products Corp., Chicago, Ill. USAF recently accepted a prototype tank.

► Ryan Aeronautical Co. has fabricated a large number of wing sections from aluminum alloy, stainless steel and titanium alloy for comparative check under Navy contract.

► Development of a two-way radio approximately the size of a package of cigarets is near, Army says. Reason for this optimism: A recent study report on a piece of electronic equipment occupying 100 cu. ft. of space indicates that with full application of transistors it could be reduced to 2 cu. ft., with a commensurate reduction in weight and cost.

► University of Michigan has an Army contract to study battlefield-surveillance problems. Technical fields being investigated include radar, battlefield illumination, infrared techniques, seismic and acoustical devices and equipment. Army expects that an interim system, limited in scope by available equipment, will be in operation by the end of 1955.

► Ryan Aeronautical Co. has a million-dollar classified contract for "very large components" of stainless steel and aluminum. President T. Claude Ryan says it is "presumably for application in a rocket or atom-power project of some kind" and puts Ryan into a new field of production.

► USAF procurement officers were puzzled by published reports of a statement by Curtiss-Wright president Roy T. Hurley that Air Force planned to cut purchase prices enough to hold company earnings at the same level as before expiration of excess profits tax. Taxes have not and will not be a factor in negotiating contracts, a procurement officer said. Air Force added, however, that lower prices will be sought whenever possible.

► XF-84H, Republic Aviation's turboprop-powered fighter, is scheduled to fly in August with an Allison T40 and an Aeroproducts propeller. Air Force will use the plane to check supersonic propeller characteristics. Fitted with another type Aeroproducts prop, it also will undergo Navy carrier trials.

► Air Force probably will have $411 million to obligate for electronics and communications equipment in fiscal 1955. The carryover from fiscal 1954 funds is estimated at $106 million and House Appropriations Committee has approved USAF's request for $305 million in new money.

► Lead time on the Pratt & Whitney J57 engine is now 14½ to 15 months, according to Brig. Gen. T. P. Gerrity of USAF's materiel staff. Lead time a year ago was 17 to 18 months.

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MAY 3, 1954

ACC Urges Air Mergers, Subsidy Phaseout

- **Policy review draft says airline route structures should be revised if necessary to build self-sufficiency.**
- **'Controlled entry' of nonskeds upheld, but need is seen for new certificate covering charter-type operations.**

By G. J. McAllister

Orderly withdrawal of federal subsidies for domestic air transport industry is recommended by the Air Coordinating Committee in its aviation policy review for President Eisenhower.

Other major recommendations, included in a draft circulated last week throughout the government and subject to final ACC and Presidential approval:

• **Local service.** Route structures of various local service airlines should be adjusted to provide the maximum opportunity to improve their economic position. Where continued and significant progress toward self-sufficiency is not demonstrated by a feederline, its operating authority should be terminated in an orderly fashion.

To the extent that the services formerly provided by the airline clearly are required to meet a public need, they should be furnished by another carrier capable of providing the services without subsidy or at a substantially reduced cost to the government.

The program of route adjustments should be integrated with a definite schedule for an orderly phased reduction and eventual elimination of subsidy support for the local service airlines.

• **Nonscheduled.** ACC reaffirms the "controlled entry" principle of the Civil Aeronautics Act and recommends that exemption authority be used only in limited and exceptional circumstances. There should be no general use of the exemption authority in the future as a basis for authorizing route-type common carrier transportation.

Bona fide charter operations of the large irregular airlines represent a supplemental type of service that should be encouraged. A new type of certificate should be developed for such operations.

• **Trunklines.** Plans should be developed for consolidation of trunk airlines into fewer systems, each carrying its fair share of uneconomical and developmental services.

The program of route adjustments and mergers should be integrated with that of withdrawing subsidy from trunklines. Operation of uneconomic competitive services should be avoided or eliminated.

• **Routes.** Continuing policy of Civil Aeronautics Board should be to adjust and develop air routes that will achieve a self-sufficient air transportation system made up of units capable in size and economic strength of meeting present national needs and prepared for sound growth and modernization.

Air route pattern development must take into consideration the advantages represented by continued technological progress in the field of aircraft design and performance.

• **Overseas operations.** National interest factors require that many international routes be maintained despite subsidy requirements. Route decisions in this area should recognize the necessity of avoiding or eliminating uneconomic duplication of service between U. S. carriers.

ACC's committee working group notes that U. S. territories are dependent upon air transportation for rapid communication, often lack adequate highspeed surface transportation and in many instances are unable to support self-sufficient air transport operations. Under these circumstances, duplication of services must be avoided and competition restricted to the essential minimum.

• **Mail.** U. S. should continue to encourage and develop the transportation of mail by air when airlines can expedite delivery without undue cost increase. Post Office Department should continue experimenting with the transportation of first-class surface mail by air.

Implementation of the intent of Congress that subsidy be separated from airmail payments to air carriers is urged. Service mail rates should be established on the principles of fair compensation for services performed and will exclude all elements of subsidy.

• **Cargo.** Further development of the air cargo industry, with particular emphasis on all-cargo flights, should be encouraged. The government and industry should cooperate in the development of new all-cargo transports suitable for military and civil use and that the aircraft should be made available to civil operators as soon as practical consistent with military needs.

When CAB finds a public need for establishment or continuance of any certified all-cargo airline, the Board should grant a certificate of sufficient duration to facilitate adequate financing and operating stability.

• **Airports.** Federal government should aid airports but concentrate upon those of national interest with essential types of construction. Program of aid should be coordinated with all interested federal agencies and local governments, including states and counties.

And private interests are encouraged to establish, operate and maintain airports open to the public and meeting accepted design standards. Uniform standards for airports should be coordinated by the federal government and advisory service rendered.

• **Joint use of airports.** When desirable or necessary in the public interest, joint civil-military use will be made of airports—existing or planned. Feasibility of joint civil-military use will be determined after evaluation of such factors as safety, operating needs of users, rights of established tenants, public convenience and the overall public interest. If federal agencies concerned cannot reach agreement in joint use, ACC will make the decision.

• **Use of foreign airports.** Policy of constructive diplomatic action to arrange long-term rights of use of foreign airports will be continued. Agreements that contemplate U. S. assistance in construction or improvement of airports in foreign countries must provide for long-term rights of use by U. S. civil and military aircraft.

• **Airway user charges.** ACC believes domestic civil aviation is able to make a reasonable contribution toward meeting the costs of the airways system by inauguration at this time of a program of domestic airways users charges.

The committee recommends to Congress that such a program for aviation be treated as an integral part of a comprehensive program of user charges, covering all forms of transportation, for

recovering the cost of government-furnished facilities, services or grants-in-aid.

• **Common system.** Federal government should adhere to the existing policy that provides for a single national system of air navigation and air traffic control. Special military requirements peculiar to air warfare are expected. The common system will be part of the U. S. air defense system.

• **Financial.** Profit margin under a contract will be negotiated on a business basis in each individual case without application of rigid formulas, so that the government can properly take into account each contractor's contribution to the basic objective of providing the best equipment at the least cost.

• **Production financing.** Order of preference as to the form of financing is as follows: private financing with governmental guarantees; guaranteed loans with financing institutions participating to an extent appropriate to the risk involved; progress payments; advance payments.

• **Amortization.** Extent to which accelerated amortization charges are allowed as an element of cost under government contracts is determined on a business basis by individual cases. Among the major factors to be taken into account: probable future need for the facility to supply military or civilian markets, effects of obsolescence on its future usefulness and possible alternative uses to which it might be converted.

• **Export financing.** Export-Import Bank should continue to make loans and to guarantee those made by others for the purpose of financing export sales in appropriate cases and where necessary.

• **Mobilization.** The Civil Reserve Air Fleet, the War Air Service Pattern, the Air Priorities System and certain other related mobilization measures are designed to be activated in the event of full mobilization.

Requirements of partial mobilization for airlift from the civil fleet should be met, so far as possible, on a voluntary basis worked out by negotiations between the military departments and the airlines in the manner of the Berlin and Korean airlifts.

• **Rights exchange.** U. S. will oppose the imposition of arbitrary, capricious or uneconomic restrictions on the service of U. S. international air carriers, foregoing as necessary agreements with nations that insist on rigid or unrealistic controls.

Bilateral agreements should continue to be used until it is possible to achieve a multilateral agreement that embodies principles generally in accord with existing bilateral agreements.

• **International rates.** Congress should be asked to grant CAB adequate powers, through amendment of the Civil Aeronautics Act, to control effectively the fares, rates, rules and practices applicable to transportation to and from the United States of both U. S. and foreign airlines.

• **Safety.** Air carriers, manufacturers and other industry organizations are expected to assume primary responsibility for assuring adherence to safety standards within their organizations. Government inspection procedures should be limited to spot-checking.

• **Civil aircraft development.** Private industry should be responsible for the development of advanced civil transport aircraft and the prototype testing bill abandoned.

However, the federal government should underwrite a test program of simulated airline operation after development of advanced transport aircraft before their use in passenger service. ACC will investigate methods for such federal aid.

There should be increasing cooperation between civil and military agencies regarding the design, development, testing and approval of new and improved air transport aircraft. This should include mutual representation on military-type inspection and civil-type certification boards.

• **Rotary-wing aircraft.** The government should encourage the early use of helicopters by airlines in simulated air carrier operations, when consistent with national security, to accelerate attainment of a reasonable goal of economy and safety.

Government also should support convertiplane development through basic research by the National Advisory Committee for Aeronautics and continuation of current military developments.

• **Material allocation.** Airline-type transport aircraft, and maintenance, repair and operating supplies for U. S. air carriers should continue to be produced on a basis of equal priority with similar military equipment.

Friendly foreign airlines should be accorded substantial equality of production priority with U. S. carriers.

▶ **Economy Theme**—Underlying theme of the draft is one of stringent economy (Aviation Week Apr. 5, p. 11). The recommendations concerning feeders and nonscheduled airlines are certain to draw strong opposition, observers forecast. Chances that Congress will approve elimination of local service airlines appear slim.

However, ACC is looking beyond the present state of transport development. A draft of the preface states:

"In the discharge of its promotional responsibilities under the act toward air transportation, the government has followed a policy of assistance through subsidy. It cannot be questioned that such a policy has substantially hastened the development of the industry technically, in public service and in scale of operations. We believe this policy has made a significant contribution to our welfare.

"Nevertheless, the subsidy policies followed by the government have a profound influence on the character of the industry's development, not only for the carrier currently receiving subsidy payments, but also for the carriers which are still eligible for renewed subsidy in the future. Federal subsidy policies can affect the entire tone of the industry's management.

"On the positive side, subsidies can be a constructive tool for stimulating the development of essential services. On the negative side, they can be a means for preserving an uneconomical structure of the industry. By shielding carriers from the full impact of normal economic forces, they can weaken the normal business incentives for maximum economy and efficiency.

"In short, subsidies can be a cause, as well as an effect, of the economic problems of this industry. . . ."

New Republic Jet Team Aloft

First flight view of Republic RF-84F Thunderflash (top) and F-84F Thunderstreak together points up the differences in configurations of the two types. Thunderflash has elongated "solid" nose for mounting reconnaissance cameras; the air intakes for Wright J65 Sapphire jet are in wing roots at leading edges (Aviation Week Mar. 29, p. 25). Fighter-bomber Thunderstreak has nose-intake.

Hibbard Outlines A-Plane Design

Supersonic long-range strategic bombers 'in being within 10 years,' Lockheed executive predicts.

By William J. Coughlin

Santa Monica, Calif.—Nuclear-powered military aircraft will be flying within 10 years, Hall L. Hibbard, engineering vice president of Lockheed Aircraft Corp., predicted last week.

Lockheed holds one of several military contracts for the design of nuclear-powered aircraft.

Hibbard made his prediction at a state convention of the Air Force Assn. His seven-page report was one of the most detailed on the subject yet cleared by security.

▶ **Divided Shielding**—The engineering chief was permitted to discuss a new approach to the problem of shielding the aircraft and its crew from radiation. He indicated Lockheed may divide the protective shielding, placing it around the crew compartment as well as the reactor. This would permit the shielding to be of lighter weight.

He did not discuss what it would mean in terms of aircraft design, maintenance problems or radioactivity levels for portions of the aircraft other than the crew compartment.

Prior to his speech, the Air Force had permitted Lockheed to issue only one 38-word publicity release on the subject during the four years the company has been studying application of nuclear power to aircraft.

▶ **Little Change**—Noise level of nuclear-powered aircraft will be about the same as that of today's airplanes, Hibbard said, and their gross weights probably will be no higher.

"It is certainly true that particular nuclear-aircraft designs may prove to have novel and radical features compared to today's products," Hibbard said, "(but) it is safe to say that, in general exterior appearance, no particular differences need be expected.

"The wing and tail need be no different because of the powerplant. The practical eye might detect some decrease in the number of wing access doors due to the lack of a chemical fuel system, but no other differences are inherent."

Nuclear-powered aircraft should show no startling characteristics in flight, the Lockheed engineering executive said. The engines will not leave any smoke trails and the noise from the engines probably will be about the same as today's aircraft at the same power level.

"Insofar as aircraft size is concerned," he said, "let me say that I expect that nuclear aircraft will be no larger than some of today's large military aircraft, and their gross weights will probably be no greater. I am hopeful that they may prove, in fact, to be actually smaller and lighter as the powerplant science progresses. Because so much of their weight is in dense, concentrated shielding material, they should generally prove somewhat smaller for a given gross weight than their chemically powered counterparts."

HIBBARD: A-powered bomber in 10 years.

▶ **Domesticated A-Bomb**—The nuclear reactor that is the heart of the propulsion system, Hibbard said, is essentially a simple device in which a proper arrangement of uranium, moderator, reflector, and controls permits sustenance of a controlled, continuous, fission process—"a sort of domesticated atom bomb."

The reactor is the source of heat that will be used to operate the engines and of radiation which could injure both the people and the materials which it strikes, he said.

This nuclear power may be used in several ways.

"The heat source may be used to drive a turbojet engine, or it may be used to drive a turboprop engine, and still a third use is for rocket engines," Hibbard pointed out. "In any case the reactor effectively replaces the conventional combustion chambers of the engine by supplying the heat which would normally result from burning chemical fuel."

Complexity, type and arrangement of powerplants will be determined by the method used to transfer the heat. Various methods of heat transfer may be used to convey the heat generated in the reactor to the propulsion machinery.

"One of the principal tasks in the field today is the continued, careful consideration of all such schemes so that powerplants finally built will represent the best and most promising approaches to the entire problem," the Lockheed vice president said.

▶ **Different Approach**—In regard to the shielding required to protect the aircraft and its crew from radiation, Hibbard indicated that Lockheed may be exploring a somewhat different approach than that used in, say, atomic submarines.

He said the usual concept of reactor shielding represents what is called a "unit shield." That is, all of the shielding necessary to reduce the radiation to a level tolerable to the human body is placed directly around the reactor power.

While unit shielding is a sound approach with several significant advantages, Hibbard commented, it also is very heavy.

▶ **Proper Compromise**—"It has been found that a lighter total shield weight is possible if only some of the shielding is put on the reactor and the rest is placed around the crew at the flight station," he said. This is known as "divided shielding."

"It is apparent that divided shielding will be most advantageous and applicable when the flight crew is concentrated in one area and, further, when that area is fairly small, since the occupied quarters must be completely surrounded by shielding. Just as locating of all the shield at the reactor imposes a weight penalty, so putting too much shield on the crew and too little on the reactor leads to high total shield weight.

"The proper compromise must be arrived at not only by striving for low weight, but also by recognizing the effects on airplane service and maintenance, type of reactor and heat transfer system, and many other secondary but important aspects of shield division."

▶ **Unlimited Endurance**—One of the most significant aspects of nuclear-powered aircraft will be their unlimited endurance, regardless of speed, Hibbard said. This, he pointed out, is a more basic definition than the popularly recognized advantage of unlimited range.

On many missions where speed and range pay no dividends, he noted, endurance does—as on search, reconnaissance, patrol, or refueling missions.

While nuclear power appears to have no magic attributes that automatically guarantee its complete system superiority over chemically powered means of accomplishing the same objective, Hibbard said, weapons system analyses are underway to determine the areas of superiority for nuclear power. Similar analyses will be made to determine the desirability and economics of nuclear-powered transports for commercial airlines.

Hibbard predicted that the first gen-

eration of nuclear-powered aircraft will be strategic bombers having supersonic speed capabilities for truly intercontinental missions—"in being within 10 years." These will be followed by nuclear aircraft for other military missions, such as patrol and sea search, reconnaissance, and, a little later, logistics carriers or cargo transports.

▶ **Mach 3?**—"Not too much later," he said, "I expect we will have solved the radiation and shielding problem to the extent that the first nuclear-powered supersonic commercial transport will be proven practical. It will fly at least two and perhaps even three times the speed of sound, crossing the country in less than two hours.

"When this day comes to pass, nuclear-powered aircraft will have come of age with a vengeance; I confidently look forward to that time, because the nuclear-powered airplane is a practical device that is coming and coming to stay."

Symposium Highlights

Santa Monica, Calif.—Highlights of other talks at the Air Force Assn.'s symposium on "the next 50 years of flight":

Charles F. Horne, manager of Convair's Pomona Division. The Terrier ground-to-air missile, now in quantity production at Pomona, has progressed to the point where scientists and engineers no longer are necessary to operate, maintain and fire them effectively. "I am pleased to state that firings of our missiles are in the competent hands of our Navy and Marine enlisted men."

He said tests at the Naval Ordnance Test Station at Invokern, Calif., and at the Naval Operational Development Force at Norfolk, Va., show that in percentage of hits the Terrier has been "very successful."

Edgar Schmued, engineering vice president of Northrop Aircraft. Manned combat aircraft will disappear from the U.S. military inventory within the next 50 years.

"Military transports will be manned and operate at will at sub and supersonic speeds with the help of nuclear power." Nuclear power sources will be so abundant that the strategic missile inventory will operate almost exclusively by nuclear power.

S. K. Hoffman, chief of North American Aviation's rocket propulsion laboratory. It is entirely feasible that the rocket-powered interceptor may find a prominent place in our stable of defensive weapons.

With a rocket engine as the prime power source, an interceptor aircraft can have a phenomenal rate of climb and a service ceiling that is almost literally "out of this world." A rocket-powered aircraft is ideally suited to short duration applicatons of vertical-takeoff fighters, Hoffman said.

He predicted establishment of a satellite space vehicle "within our lifetime."

Dr. Heinz Haber, University of California at Los Angeles. Space flight hinges not only on the problem of adequate propulsion but also on the problem of aerodynamic heating.

Atmospheric regions between 100,000 and 400,000 ft. appear for the present to be unsuitable for sustained flight. At 200,000 ft., for example, aerodynamic heating limits maximum permissible speed to Mach 5.

At present-day wing-loadings, however, an aircraft, in order to remain airborne at this altitude, must fly at least Mach 10. "We then have the choice between two alternatives: We can either fly at 10 Mach and burn up, or we can fly at 5 Mach and fall down. In the first case, we are too hot and, in the second case, we are too slow. Should we attempt to fly at 7.5 Mach, we are too hot and too slow.

"In other words, we can't fly at all at a height of 200,000 ft. In the present state of the art of flying, we can operate an aircraft in sustained flight only to a maximum altitude of about 100,000 ft."

Arthur E. Raymond, engineering vice president of Douglas Aircraft Co. Turboprop and turbojet transports will play a dual role in the commercial air transport picture. Raymond predicted a simultaneous development of the two types, with pure jets employed for long-range deluxe passenger service and turboprops for shorthaul and cargo.

Gen. George C. Kenney, president of the Air Force Assn. Dreams of aviation's future are clouded by the Russian menace, "the greatest threat that has ever confronted mankind." The Russians have the largest air force in the world and are capable of dropping H-bombs on any part of the United States.

"I am certain that the day their stockpile reaches the figure they have decided is enough to crush this country and our allies, the boss man in the Kremlin will blow the whistle and the test will come."

Doman, Fleet Form New Copter Company

Doman Helicopters, Inc., Danbury, Conn., and Fleet Manufacturing Ltd., Ft. Erie, Ont., have confirmed the formation of Doman-Fleet Helicopters, Ltd., at Ft. Erie (AVIATION WEEK Nov. 2, 1953, p. 7).

The new company will build the Doman LZ-5 (H-31) eight-place copter, with indications that first production of the craft will be for private Japanese interests.

The copter is powered by a 400-hp. Lycoming engine.

▶ **Turbine Copter**—Doman has built two H-31 Army versions of the LZ-5 at its Danbury facility. It has plans to convert one of the copters to Boeing gas turbine power but is awaiting instructions from Army.

The new Canadian company has 263,000 sq. ft. of floor space and, according to Glidden Doman, president of the U.S. firm, has adequate machine tools for major production. During the war, some 3,000 PT-26A Cornell trainers were produced by Fleet for the British Commonwealth Air Training Plan. Company presently is producing major components for Canadair-built North American Aviation F-86 Sabre.

Doman's principal production at present is subcontracting on unspecified aircraft projects.

▶ **New Backing**—The company president reports new financing for the U.S. company:

"Previous minor du Pont family interest in Doman is being extended through a combination credit arrangement and the negotiation of a long-range financing plan in order to give the company adequate financial capability, lack of which previously has been an obstacle to production acceptance of the H-31."

Doman explained to AVIATION WEEK that Army has not ordered the H-31 into production because of inadequate financing arrangement.

Temco Pushes Twin Navion Sales

Completed Temco Twin Navion conversions lined up at Greenville, Tex., point up the company's switch to emphasis on sales of the new twin-engine business plane following intensive market studies and product improvement phase. Temco says prospects indicate continued sales averaging one Twin Navion a week. Approximately 50 of the planes have been sold so far.

'55 Airpower Funds: $8.9 Billion

House committee approves $2.76 billion for USAF, $1.97 billion for Navy; carryover totals $4.19 billion.

The $4.7 billion in new money approved by House Appropriations Committee for aircraft and related procurement by Air Force and Naval Aviation will make a total $8.9 billion available for obligations during fiscal 1955, beginning July 1.

The House committee accepted, without change, the $2,760 million recommended by the Administration for USAF aircraft procurement but expressed some apprehension over the huge unobligated balance of $3,691 million that will be on hand July 1.

It commented: "The committee is not particularly happy that so much apparently unnecessary money has been appropriated in the past as is indicated by the large carryover of unobligated balances. It would be very much preferred if only those amounts that could be reasonably programmed and obligated were to be appropriated for a given year.

"However, it is recognized that the reprogramming which has taken place over the past 12 months has made it impossible to enter into firm, well-defined contracts as rapidly as might have been done had that reprogramming not been necessary."

► **$13-Million Cut**—The carryover and the new money voted by the committee will give USAF $6,451 million for procurement contracting in its 1955 fiscal period.

The committee approved $1,974 million for Naval aircraft procurement, trimming $13 million off the Administration's request of $1,986 million. The cut was made in an item for expansion of missile facilities, because the testimony of the Navy, according to the committee, "was replete with indications of uncertainty."

A normal carryover of $500 million, with the new money voted, will give the Navy $2,474 million to obligate for the procurement of aircraft during the 1955 fiscal year.

► **Spares Policy**—Although approving the total USAF procurement request, the committee criticized overstocking on spares and spare parts under "outmoded concepts which do not reflect the effects of new weapons upon warfare."

The committee's report observed: "There appears to be preparation . . . for massive sustained operations similar to those experienced during World War II, although the facts show that a very small number of planes can now carry more destruction than all the planes on all the sorties in World War II. Therefore . . . at least the reserve aspects of the spares and spare parts program should be re-evaluated.

"In addition, the committee feels that through a carefully planned use of this program the services have a tool which should be very helpful in sustaining a healthy in-being aircraft industry throughout any period of years that it may be necessary to maintain a posture of military strength.

"In other words, by buying spares and spare parts as far as possible on an as-and-if-used basis, keep support production going long after the initial aircraft is procured, rather than buy so very much of the spares and spare parts concurrently with the aircraft as at present."

► **Future Increase**—The committee also disclosed that Naval funds for aircraft procurement can be expected to rise in future years because the number of planes funded with the $1,974 million provided for fiscal 1955 "is somewhat below the number estimated by the Navy to be required annually on a level basis to maintain currently authorized forces in a fully modernized condition."

In future years, the committee declared, "the appropriation will have to be considerably higher than $1,974 million."

► **Budget Picture**—The total budgets approved for the three services by the committee indicate increased emphasis on the Navy, compared with the fiscal 1954 budgets:

	Fiscal 1954	Fiscal 1955
	(Figures in billions of dollars)	
USAF	$11.2	$10.8
Navy	9.4	9.7
Army	12.9	7.6

Other major actions taken by the committee:

- USAF's request of $431 million for research and development was trimmed $21.5 million. The committee said the cut "should not affect the level of basic essential research and development work" since, with a carryover of $85 million, there will be $494 million available for obligations during fiscal 1955.

USAF's unexpended balance on July 1 for research and development will be $923 million, according to the present estimate.

- All funds for Naval research and development were lumped together in an overall research and development fund of $419 million. In the past, Office of Naval Research has been given an appropriation for basic research, and Bureau of Aeronautics and the Navy's other technical bureaus have received separate appropriations for advanced research and development.

The committee lumped the $178 million proposed for fiscal 1955 for aviation research and development into the overall fund so Navy would have one research and development appropriation.

- The committee cut $50 million from USAF's maintenance and operations funds for spares and spare parts. USAF asked for $525 million for maintenance spares, the committee allowed $475 million.
- Funds for construction of a fourth Forrestal-class carrier and a third nuclear-powered submarine were approved.
- A ceiling of $3.5 million for public

USAF Obligation Plans for '55

USAF now estimates it will wind up fiscal 1954 on June 30 with $3.7 billion in unobligated funds for aircraft and related procurement, instead of the original estimate of $1.9 billion. With this carryover and $2.7 billion in new funds, USAF has programmed obligations totaling $6.4 billion for fiscal 1955 as follows (figures in millions of dollars):

	Unobligated balance brought forward July 1	Fiscal 1955 new appropriation	Total
Complete aircraft	$1,283.3	$1,996.8	$3,280.1
Initial spares and spare parts	1,485.0	175.9	1,660.9
Related procurement, (machinery, training items, preproduction costs, service test material)	476.7	104.0	580.7
Modification of in-service aircraft	161.0	142.2	303.2
Guided missiles	284.2	265.1	549.3
Industrial mobilization	1.1	15.0	16.1
Procurement and production administration	.....	61.0	61.0
Total	**$3,691.3**	**$2,760.0**	**$6,451.3**

information services of Department of Defense and the three services means a substantial cutback from the current level of $4.5 million. Each of the services is earmarked for $920,000 and Department of Defense for $740,000.

• A permanent law is included in the defense supply bill providing for penalties for defense contractors who offer or give gratuities—"in the form of entertainment, gifts, or otherwise"—to any officer or employe of the government "with a view toward securing a contract or securing favorable treatment with respect to . . . a contract."

The government is given authority to declare "break of contract" penalties against the contractor and, in addition, is entitled to "exemplary" damages of three to 10 times the gratuity cost.

SEC Acts to Block Horton Stock Sales

Los Angeles—Securities & Exchange Commission last week filed suit in federal court for an injunction to halt sale of stock by the Horton Aircraft Co.

Complaint charged the company is selling stock without registration and making untrue statements to stock purchasers interested in the Horton "wingless" airplane (AVIATION WEEK Feb. 1, p. 17).

The suit alleged the airplane is "a converted, obsolete and conventional aircraft with certain Horton modifications which have destroyed its airworthiness and that it does not represent any achievement or advance in aviation; that it is unsafe, completely unfit for any commercial purpose and can barely sustain flight, even without any payload."

It is said that among false statements made to stock purchasers are:

• "That in the history of aviation the achievements of William E. Horton in producing the Horton wingless airplane are comparable to the achievements of Wilbur and Orville Wright, Leonardo da Vinci, Sikorsky, Billy Mitchell and Charles Lindbergh.

• "That the plane can carry 100% greater payload over 100% greater range than any other airplane; that it can carry twice the load at half the cost of any other plane and is safe, faster and easier to control than any other plane; and that a proposed Horton wingless Jumbo transport will carry 4,000 people 25,000 mi. (around the world) nonstop at 60,000 ft. altitude at speeds in excess of 400 mph."

After issuing a temporary restraining order to halt stock sales, U.S. Judge Earnest A. Tolin set May 3 for hearing on an order to show cause why a permanent injunction should not be issued.

Officials of the company were unavailable for comment.

CAB Blames Crews In Inflight Collision

Civil Aeronautics Board blames both crews in the inflight collision over Michigan City, Ind., Aug. 26, 1953, of a Cleveland-bound United Air Lines Convair 340 and a Detroit-bound American Airlines Convair 240 (AVIATION WEEK Sept. 7, p. 75). The planes were at 10,800 ft. when they collided.

CAB crash investigators found the primary cause of the accident was "failure of the United crew to observe and avoid the American aircraft while overtaking it on a converging course, from the left and rear.

"However, the American crew demonstrated a lack of alertness in not observing United prior to passing and while abeam."

▶ **Pilot Responsibility**—Despite the serious damage to the Convairs, both landed safely—UAL at South Bend and American at Chicago. Passengers were shaken up by the collision.

Since both aircraft were on VFR flight plans, CAA Air Route Traffic Control was not responsible for providing en route separation, the report says. "It was the responsibility of the pilots, under Civil Air Regulations, to maintain separation from the other aircraft," rules the Board.

▶ **Damage**—United Flight 314 took off from Chicago's Midway Airport at about 6:58 p.m., climbed to 11,300 ft., descended to about 10,800 ft. and had been in level flight for 30 or 45 seconds before the collision, investigators report.

American's Flight 714 took off behind the UAL 340 one or two minutes later and still was climbing at the time of the collision. Impact damage to the American Convair extended under the fuselage from the forward edge of the left rear service door to the rear. It ripped a hole 86 × 154 in. in the underbelly.

The right front top section of the cockpit of United's Convair practically was flattened and the skin crumpled. Scuff marks on the upper skin of the fuselage were at an angle of approximately 45 deg., investigators say. The left wing skin of the UAL transport was gashed about two feet outboard of the landing light and about five inches above the leading edge centerline.

Investigators also found a deep gouge in the leading edge of one blade of the left propeller.

Peale Predicts Steady Pace for Air Industry

Stable production levels over a long term are closer to realization for the aircraft industry today than at any time in its history, says Mundy I. Peale, president of Republic Aviation Corp.

Peale told the New York Society of Security Analysts that the buildup to a 137-wing Air Force plus world-wide military commitments should permit the industry to approximate its present production rate of 12,000 planes annually for some months, with a slight leveling off thereafter. He emphasized that USAF will not attain full strength for two-and-a-half years under present schedules.

Peale expects Republic to at least equal 1953's sales of $411,810,000 in 1954. Noting that one out of every four persons now living on Long Island, N. Y., makes aviation work his livelihood, he gives Republic's expected payroll for this year as some $130 million and says the company is the

Chile Buys Armed Beech 18s

Chilean air force has taken delivery on the first of a number of Beech D18S tactical support and armament trainer aircraft similar to the one pictured above. The planes are fitted with two .50-cal. machine guns in the nose and rocket and bomb racks beneath the wings. In addition to its guns, the D18S can carry two 100-lb. bombs or 12 2.25-in. rockets. This new armed version of the Twin-Beech is designed to be the successor to the company's AT-11 bomber and navigation crew trainer built during World War II. Modifications are external, and armament controls in cockpit do not disturb the normal layout of the instrument panel. First armed D18S was converted by MacDonald Bros., Winnipeg, Man., Beech modification and overhaul facility. First production model has been delivered from Wichita, Kan.

largest single manufacturing employer in metropolitan New York.

In addition to its work on fighters and fighter-bombers, Republic has received some guided missile study contracts and expects to receive missile production contracts.

Stockholders Approve UAC-CV Separation

East Hartford, Conn.—Separation of Chance Vought Aircraft Inc., of Dallas, Tex., from United Aircraft Corp. (AVIATION WEEK Dec. 14, 1953, p. 14) was approved by UAC stockholders last week at their annual meeting here.

Action by the stockholders insured emergence of Vought as an independent manufacturer of aircraft and guided missiles before the end of 1954 without legal or corporate UAC connections, except that initially its stockholders also will hold UAC common.

► **Stock Plan**—Present plans call for distribution of Vought stock at a ratio of one share for every three shares of UAC common stock held. UAC officials said this ratio may be changed by United directors "if circumstances arise that would make a different ratio advisable." Prior to the Vought stock distribution, application will be made for its listing on the New York Stock Exchange.

Chance Vought, Inc., was organized Jan. 1, 1954 as a Delaware corporation with authorized capital consisting of 200,000 shares of preferred stock with par value of $50 each, none of which is issued or outstanding, and 500,000 shares of common stock with par value of $1—UAC holds 100,000 common.

► **Plan to Be Altered**—When the plan is consummated, the common stock capitalization will be altered to allow a suitable distribution. With the transfer of virtually all of the assets of UAC's Chance Vought Division to the new corporation, it had net assets of $17,362,303 Jan. 1, 1954, equal to about 11% of UAC's consolidated net assets. On the same date Chance Vought Aircraft Inc. had a backlog of approximately $340 million.

Figures presented to UAC stockholders indicated Vought's steady growth since the division moved to Dallas from Stratford, Conn., in 1948. Net earnings before federal income and excess profits taxes increased from a loss of $2,143,240 in 1949 to a profit of $10,118,362 for 1953. Similar earnings before taxes for intervening years: $1,903,474 for 1950; $4,650,792 for 1951; $3,642,507 for 1952.

Sales for the same period: $29,087,000 for 1949; $34,100,719 for 1950; $49,127,459 for 1951; $76,335,184 for 1952; $129,540,101 for 1953.

► **Tax Elimination Aids**—Preliminary figures for the first quarter of 1954 indicate Vought deliveries totaled about $35 million. UAC deliveries, excluding Vought, were about $165 million. UAC earnings on the first quarter, including Vought, are estimated at $2.30 per share. This compares with $1.75 per share for the first quarter of 1953.

Excluding Vought, UAC earnings are estimated at $1.90 per share. Increase in first quarter earnings was reflected almost entirely by the elimination of the excess profits tax, according to F. B. Rentschler, UAC chairman.

Vought now occupies 2,300,000 sq. ft. of plant area in the Naval Industrial Reserve aircraft plant at Dallas, employs about 13,000. It also has 200 engineers working on advanced developments in a Boston, Mass., facility.

The Dallas plant, producing F7U-3 Cutlass carrier-based fighters for the Navy, will begin production this year on the A2U-1 ground support version of the Cutlass for the Marines. Company also is delivering the Regulus surface-to-surface bombardment missile and is manufacturing under subcontracts nose sections for the Boeing B-47 and empennages for the Lockheed P2V.

► **Expansion**—Further developments revolve around the XF8U-1, a supersonic carrier-based fighter which will be powered by a Pratt & Whitney J57 with afterburner, and advanced missile developments. Vought also is expected to expand its traditional fighter development to include other military types.

Since occupying the Dallas plant in 1949, Vought has invested $11,500,000 of the UAC fund in improved production facilities and has been authorized to spend about $20 million in Navy funds, of which more than $9 million were used for facility construction, remainder on production tooling.

Vought recently renewed its five-year lease on the Dallas plant, extending occupancy to Dec. 31, 1958. It has an option to renew for an additional five-year period after 1958 and the right of first refusal on purchase of the plant.

► **Management Lineup**—Officers of the new firm are: Frederick P. Detweiler, president; Harold B. Salada, retired Navy admiral and former Chief of the Bureau of Aeronautics, vice president; Newton V. Turney, Controller; Bertram O. Whitten, treasurer; and James Gaffney, secretary.

Recently five Texans were added to the Vought board of directors: D. A. Hulcy, president and board chairman, Lone Star Gas Co., Dallas; L. F. McCollum, president, Continental Oil Co., Houston; W. W. Overton, Jr., president, W. W. Overton & Co., and board chairman Texas Bank and Trust Co., Dallas; R. L. Tayloe, vice-president, Sears, Roebuck and Co., Dallas and J. Ralph Wood, president, Southwestern Life Insurance Co., Dallas.

Other directors are Detweiler, Salada, Turney and the following UAC officials: H. M. "Jack" Horner, president; William R. Robbins, vice president and controller; and C. J. McCarthy, vice president. The three UAC officials will resign as Chance Vought directors when its stock is distributed.

$104,000 Study

Commerce Department's contract with Cresap, McCormick and Paget for a management study of Civil Aeronautics Administration calls for a total payment of $104,500 and provides for salaries of from $100 to $200 a day for members of the firm, according to a copy of the contract filed with the Senate Appropriations Committee.

Members of the committee have been skeptical of the need for the study and requested details (AVIATION WEEK Apr. 19, p. 13). Sen. Pat McCarran has said it is "a complete waste of funds." The study was due to be completed May 1.

► **Rates, Expenses**—The contract provides $81,000 for these salaries: $200 a day for partners, $150 a day for associates, $125 a day for Class A seniors, and $100 a day for Class B seniors.

A total of $11,500 is provided for additional expenses at a rate of $15 a day while on travel status, plus the actual transportation expenses. The contract also provides $7,500 for charts and art work and $4,500 for subcontracting for technical personnel in electronics and other specialized fields.

Claude Witze Joins Aviation Week Staff

Claude O. Witze has resigned as director of public relations at Piasecki Helicopter Corp., Morton, Pa., to join AVIATION WEEK as military editor in the Washington office.

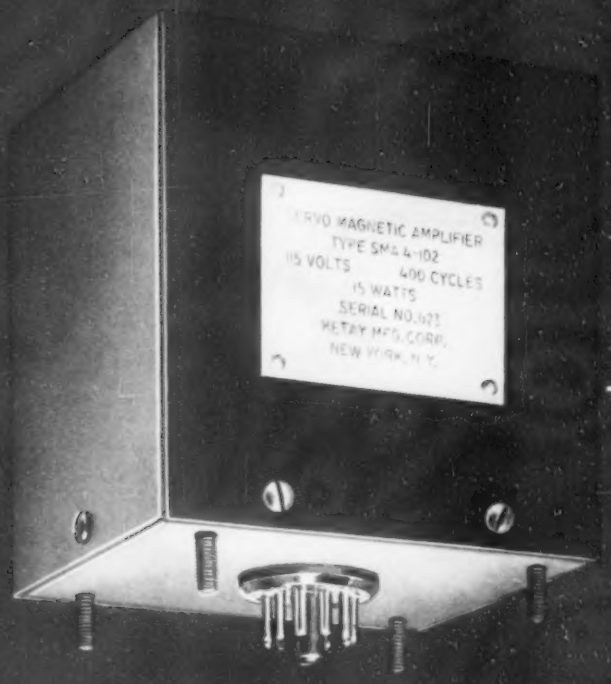
A newspaperman for 17 years before he entered the public relations field in 1950, Witze was aviation editor of the Providence (R. I.) Journal and at that time served as a New England correspondent for AVIATION WEEK.

He also worked as a reporter and editorial writer for the Troy (N. Y.) Record, the Hornell (N. Y.) Evening Tribune and the Gloversville (N. Y.) Leader-Republican.

While at Piasecki, Witze served as a member of the public relations advisory committee of Aircraft Industries Assn. He is widely known in the industry both as a public relations director and experienced aviation reporter.

Ketay

presents



... meticulously tailored

MAGNETIC AMPLIFIER SERVO SYSTEMS

Typical characteristics of some magnetic amplifier and two-phase servo motor combinations available from Ketay.

SPECIFY MAGNETIC AMPLIFIER (type)	FREQUENCY (cps)	LINE VOLTAGE (volts)	LENGTH (inches)	WIDTH (inches)	HEIGHT (inches)	SPECIFY SERVO MOTOR (type)	TORQUE AT STALL (oz. in.)	MOMENT OF INERTIA (oz. in. x sec^2 x 10^4)	ACCELERATION AT STALL (rad./sec^2)	NO LOAD SPEED (min. r.p.m.)	RATED VOLTAGE EXCITATION FIXED PHASE (volts) *	INPUT POWER PER PHASE AT STALL (watts)	DIAMETER (inches)	LENGTH (inches)
SMA6-102	60	115	4 1/2	3 3/4	3 7/8	K402530	2.5	49.5	50,500	3300	115	9.2	1 3/4	2
SMA6-102	60	115	4 1/2	3 3/4	3 7/8	K402380	1.45	42.8	35,000	3200	115	5.0	1 7/16	1 5/8
SMA4-102	400	115	4 1/8	3 5/16	4 3/16	K402550-1	2.35	49.5	47,500	4800	115	9.2	1 3/4	2
SMA4-102	400	115	4 1/8	3 5/16	4 3/16	K402550-2	2.35	49.5	47,500	4800	115	9.2	1 3/4	2
SMA4-102	400	115	4 1/8	3 5/16	4 3/16	K101600-6	1.45	42.8	35,000	4800	115	6.1	1 7/16	1 5/8
SMA4-102	400	115	4 1/8	3 5/16	4 3/16	K101660	1.45	42.8	35,000	4800	115	6.1	1 7/16	1 5/8

BUORD DESIGNATIONS FOR SERVO MOTORS

K101600-6 = MK 7 MOD 0 K101660 = MK 7 MOD 1
K402550-2 = MK 8 MOD 1 K402550-1 = MK 8 MOD 0

* The control phase of all Servo Motors should be connected for 57.5 volt operation.

On the other side of this page are listed some of the synchros for which the combinations were specially designed.

Ketay supplies complete systems including gear trains and stabilization for given kinematic requirements.

Servo motor-tachometer generator combinations are also available.

Ketay welcomes the opportunity to design and fabricate amplifiers of both the conventional and miniaturized types to customer's specifications.

See Ketay's Exhibit at Airborne Electronics Conference
Dayton Biltmore Hotel, May 10-12

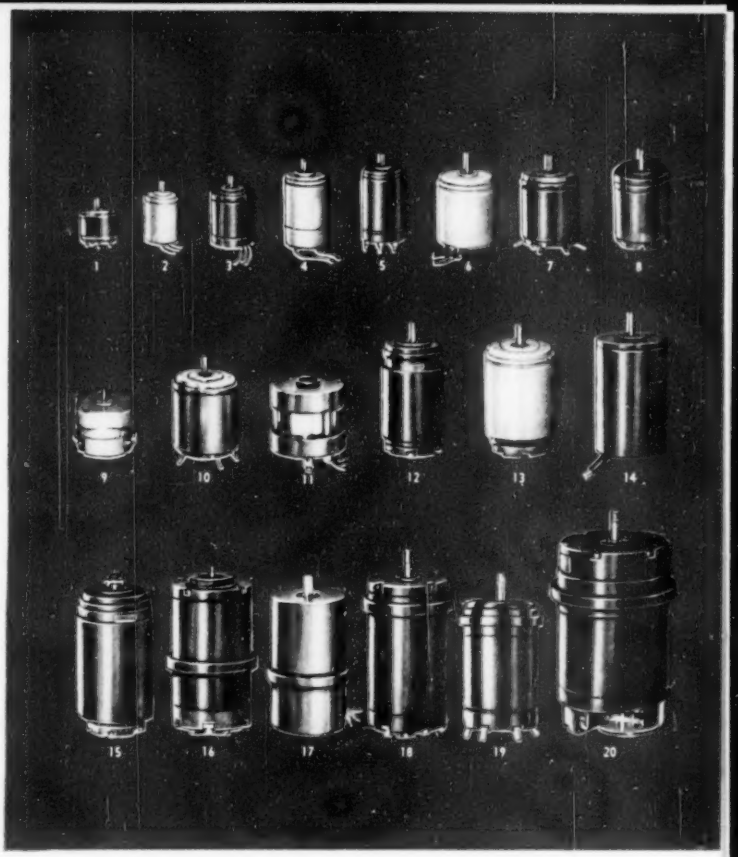
SYNCHROS • SERVO MOTORS
RESOLVERS • MAGNETIC AMPLIFIERS
AIRBORNE INSTRUMENTS
AUTOMATIC CONTROL SYSTEMS

Ketay **MANUFACTURING CORP.**
Executive Offices
555 Broadway, New York 12, N. Y.

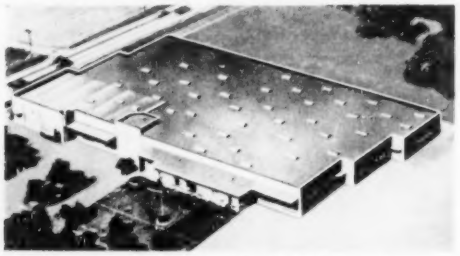
KETAY OFFERS A COMPLETE RANGE OF SIZES AND TYPES IN SYNCHROS • SERVO MOTORS RESOLVERS

1–SERVO MOTOR, Size 10 Frame, O.D. .937"
2–SYNCHRO, Size 10 Frame, O.D. .937" (Transmitter, Receiver, Resolver, Differential Transmitter, Control Transformer)
3–SERVO MOTOR, Size 10 Frame, O.D. .937"
4–SYNCHRO, Size 11 Frame, O.D. 1.062" (Transmitter, Resolver, Control Transformer)
5–SERVO MOTOR, Mk 14, Size 11 Frame, O.D. 1.062"
6–SYNCHRO, Size 15 Frame, O.D. 1.437" (Transmitter, Receiver, Resolver, Differential Transmitter, Control Transformer)
7–SERVO MOTOR Mk 7, Size 15 Frame, O.D. 1.437"
8–SYNCHRO, Size 15 Frame, O.D. 1.437" (Transmitter, Receiver, Resolver, Differential Transmitter, Control Transformer)
9–LINEAR TYPE CONTROL TRANSFORMER, O.D. 1.625"
10–SERVO MOTOR, Mk 8, Size 18 Frame, O.D. 1.75"
11–INDUCTION MOTOR, Size 20 Frame, O.D. 1.95"
12–SYNCHRO, Size 16 Frame, O.D. 1.537" (Transmitter, Receiver, Control Transformer)
13–SYNCHRO, Size 18 Frame, O.D. 1.750" (Transmitter, Receiver, Differential Transmitter, Control Transformer)
14–INDUCTION MOTOR, Size 18 Frame, O.D. 1.750", 3 Phase, 2 Pole
15–SYNCHRO, Size 19 Frame, O.D. 1.90" (Transmitter, Receiver, Control Transformer)
16–SYNCHRO, Type 1F, 1HCT, or 1HG Size 1 Frame, O.D. 2.250" (Receiver, Transmitter, Control Transformer)
17–INDUCTION MOTOR, Size 1 Frame, O.D. 2.250"
18–SYNCHRO, Size 23 Frame, O.D. 2.250" (Transmitter, Receiver, Resolver, Differential Transmitter, Control Transformer)
19–SERVO MOTOR, Size 23 Frame, O.D. 2.250"
20–SYNCHRO, Size 31 Frame, O.D. 3.10" (Transmitter, Receiver, Differential Receiver, Differential Transmitter)

Typical characteristics of 116 units are available.



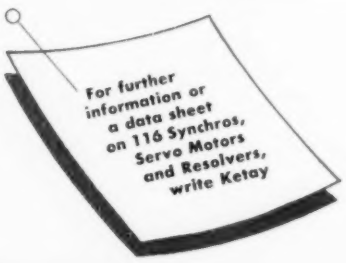
ADDITIONAL FACILITIES TO SERVE THE INDUSTRY



This plant, recently acquired at Commack, Long Island, adds air-conditioned work space that brings Ketay's total area to over 200,000 square feet, accommodating over 2,000 employees in the five divisions. Modern in every detail, the new plant has the latest equipment for precision volume production.

EXPERIENCE + RESEARCH + PERFORMANCE = LEADERSHIP

New developments and applications . . . increased facilities for volume production of components and complete systems . . . all the things reported on these pages are characteristic of Ketay—a firm with broad experience and specialized knowledge that adds up to leadership in the field of electrical devices and controls. This experience and knowledge is yours to command. In addition to synchros, servo motors and resolvers, it includes, but is not limited to: gyro components; aircraft engine instruments; computers; magnetic, resolver and synchro amplifiers; remote indicators and automatic control systems. Ketay's completely staffed and equipped Research and Development Division can be of greatest service during the design stage of applications involving Ketay products. You are invited to avail yourself of this service.

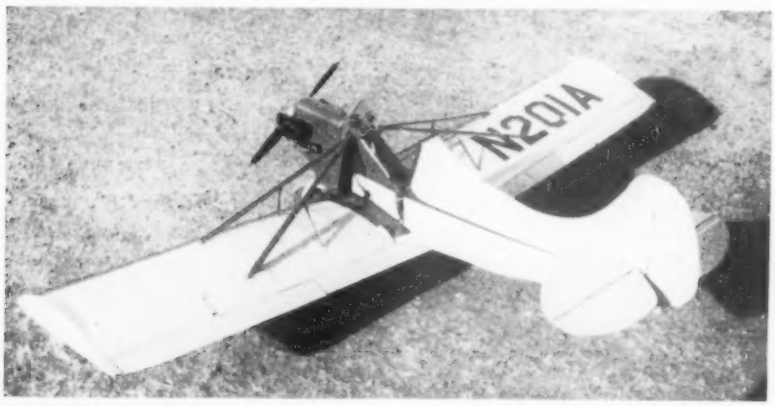


Ketay
MANUFACTURING CORP.

Executive Offices 555 Broadway, New York 12, N. Y.
Pacific Division, 12833 Simms Avenue, Hawthorne, California

New York Division • Kinetix Instrument Division • Pacific Division
Electronic Instrument Division • Research & Development Division

PILOT SITS ASTRIDE Fly-Cycle fuselage and uses motorcycle-type handlebar controls.



NARROW FUSELAGE is only 12 in. wide. Small spray tanks may be fitted in wings.

'Flying Saddle Horse' Starts Tests

Designed as a simple, rugged, short-range "flying saddle horse" for everyday use by farmers, ranchers and construction firms, the small low-wing Fly-Cycle pictured above has aroused considerable interest from potential users, reports its builder, Larry Farnham of Fort Collins, Colo. The plane recently started flight tests.

Farnham designed the Fly-Cycle as a plane he "could land on any road, or hop into the next field, leave unattended in a normal wind or use as I have a saddle horse".

Although the plane was built from scrap parts, he may put the design into production as a result of favorable comments by those who have seen it.

▶ **Handle-Bar Controls**—Highlight of the Fly-Cycle is its simplified control system around the handlebars:

• **Nosewheel** and rudder are steered by turning the handlebars in the desired direction.

• **Ailerons** are controlled by banking the bars and elevators are worked by moving the bars forward or backward.

CONTROLS have throttle on right grip.

• **Throttle** is on the right handlebar grip and is twisted just as on a motorcycle.

Controls are not coupled or restricted and cross control may be used, Farnham says.

The pilot sits astride the fuselage. There are curved metal deflectors ahead of his legs. Because the fuselage is only one-foot wide, there is little if any capacity for mounting a dust bin. But the builder says a 25-gal. tank could be installed in each wing to handle small spraying jobs.

▶ **80-Mph. Top Speed**—The prototype Fly-Cycle is powered by a Continental A-75 engine and has a top speed of approximately 80 mph. Takeoff run in a zero wind at the 5,150-ft. altitude field Farnham has been flying from is about 600 ft., he notes. It leaves the ground at about 30 mph.

Wingspan is 30 ft., length is 20 ft., and the plane weighs approximately 800 lb. empty—some 200 lb. more than what it should—because of the scrap material available. There is a 12- gal. fuel tank just aft of the firewall. Landing gear is fixed tricycle with a large 8x4-in. nosewheel for roughfield use.

▶ **Agricultural Flyer**—Farnham is president of the recently formed Colorado Airplane Dusters & Sprayers Assn., formerly known as the Colorado Aerial Applicators Assn. The group was responsible for having written the new applicator laws going into effect in the state this year, he says, and a five-man advisory committee of CADS will aid the State Department of Agriculture in administering them.

United, Western, Avco, Aro Report Salaries

Chief executives for Avco Manufacturing Corp., United Air Lines, Western Air Lines and Aro Equipment Corp. received salaries during 1953 adding up to a combined total of $305,025, according to reports filed with Securities & Exchange Commission.

• **Avco** paid its president and board chairman, Victor Emanuel, $125,000 during fiscal 1953. W. A. Mogensen, vice president and treasurer, received $75,000; James D. Shouse, vice president, $75,000; and Gen. Albert C. Wedemeyer, vice president, $60,000.

• **United** president W. A. Patterson received $100,000 salary plus $20,000 estimated annual retirement benefits. Other executive salaries: J. A. Herlihy, vice president, $43,000 plus $20,000, and Otis E. Kline, executive vice president, $45,000 plus $20,000. All officers received a total of $451,925.

• **Western** paid its president, Terrell C. Drinkwater, $55,025, and vice president-operation Stanley R. Shatto received $30,416. All WAL officials received a total of $229,175.

• **Aro Equipment** president John C. Markey was paid a salary of $35,000. Ralph W. Morrison, vice president, received $32,000; Alvar N. Abelson, vice president, $33,000; Lemuel L. Hawk, secretary-treasurer, $32,000; and Ralph A. McConnell, division manager, $48,558. All officers received a total of $243,608.

Complete RELIABILITY...

first essential in aircraft electronics

Engine-control electronic equipment is frequently installed in close proximity to the turbojet engine. Therefore, electronic components must be designed and constructed to function with *complete reliability* under extreme ambient conditions. However, the degree of reliability attained depends largely upon the attention given to detail in applying these five major design principles to every phase of equipment development:

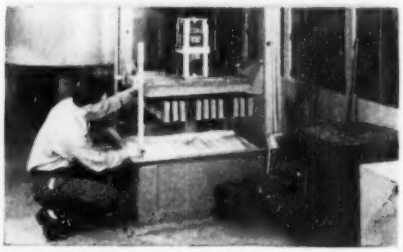
1. Conception of basically simple circuitry to accomplish desired control functions.
2. Rugged design of mechanical details.
3. Selection of components based upon extensive environmental and life tests.
4. Operation of all components well below their maximum rating.
5. Adequate performance tests of production units under dynamic operating conditions.

Strict adherence to these principles has enabled us to achieve extreme reliability in all our aircraft electronic equipment. We believe our years of concentrated research, development and tests devoted exclusively to automatic control systems for jet engines can be of real value in solving your control problems. Our engineering counsel and extensive manufacturing and test facilities are at your service. We welcome your inquiry.

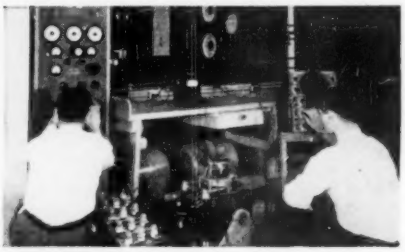
TEMPERATURE CONTROL AMPLIFIER (*Illustrated above*). Modulates exhaust nozzle area of a turbojet engine to maintain a constant turbine exit temperature. Input signal is derived from thermocouples. Output controls a servo which supplies hydraulic power to the exhaust nozzle positioning actuators.

TEST SPECIFICATIONS. **MIL-E-5009A:** Altitude, ignition proof, sand and dust, humidity, sustained acceleration, impact. **MIL-E-5272A:** Salt Spray. **MIL-E-5007A:** General specification. **MIL-I-6181:** Radio interference.

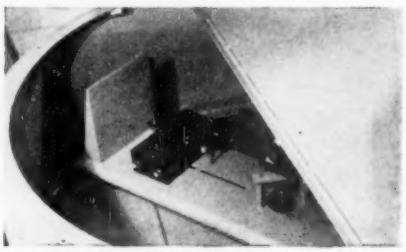
SIMULATED OPERATING CONDITIONS PROVE COMPONENT PERFORMANCE



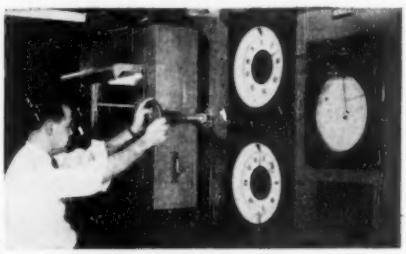
IMPACT. Unit must withstand impact shocks of 30g for a time duration of not less than 10 milliseconds.



VIBRATION. Operational accuracy guaranteed at 5g from 20 to 55cps and at 10g from 55 to 225cps.



SUSTAINED ACCELERATION. Unit must operate satisfactorily while subjected to sustained acceleration of 8g along its longitudinal axis, 10g along its vertical axis, and 5g along its horizontal axis.



FLIGHT TEST CHAMBER. Unit performance checked under simulated flight conditions within a temperature range of minus 65° F. to plus 200° F., a relative humidity of 95%, and at all altitudes up to 50,000 feet.

MANNING, MAXWELL & MOORE, INC.

AIRCRAFT PRODUCTS DIVISION • STRATFORD, CONN. • DANBURY, CONN. • INGLEWOOD, CALIF.

OUR AIRCRAFT PRODUCTS INCLUDE: TURBOJET ENGINE TEMPERATURE CONTROL AMPLIFIERS • ELECTRONIC AMPLIFIERS PRESSURE SWITCHES FOR ROCKETS, JET ENGINE AND AIRFRAME APPLICATIONS • PRESSURE GAUGES THERMOCOUPLES • HYDRAULIC VALVES • JET ENGINE AFTERBURNER CONTROL SYSTEMS.

TWA Plots Connie Flights on Jet Stream

Taking advantage of the jet stream, Trans World Airlines' Super Constellations completed 30 of 31 nonstop Los Angeles-New York flights last month in an average of 30 min. under the scheduled time of 7 hr., 55 min.

Fastest time recorded was on Mar. 20, when the west-east run was made in 6 hr., 21 min.

These times have not been by accident, TWA officials say. The route for each nonstop transcontinental flight is carefully plotted, prior to departure and while the aircraft is enroute, in order to gain the maximum advantage from the belt of high-velocity westerly winds.

► **450-Mph. Speed**—Usually found above 20,000 ft. and ranging from 100 to 150 mph. or more, these winds often push Connie speeds up to 450 mph. Here's how TWA meteorologists plot them:

• Several hours prior to departure time, charts are prepared on the expected wind flow. With these indications at hand, two procedures are employed to determine the best "time track"—the fastest route from Los Angeles to New York.

• First the aerolocation, or "single-drift" method, is used to plot a single-drift correction flight path between the

Gen. Putt Flies YB-52

Lt. Gen. Donald C. Putt (right) USAF Deputy Chief of Staff for Development, stands by the eight-jet Boeing YB-52 Stratofortress he piloted during a recent trip to the company's Seattle plant. With Putt is A. M. (Tex) Johnston, Boeing's chief of flight test, who accompanied the general on the flight.

Warner SEQUENCE VALVES

Warner Sequence Valves, designed for any system pressure up to 3000 psi, are adaptable to a wide range of hydraulic applications. These economically priced valves have low leakage and low operating force characteristics.
SOMETHING MORE THAN ACCURACY

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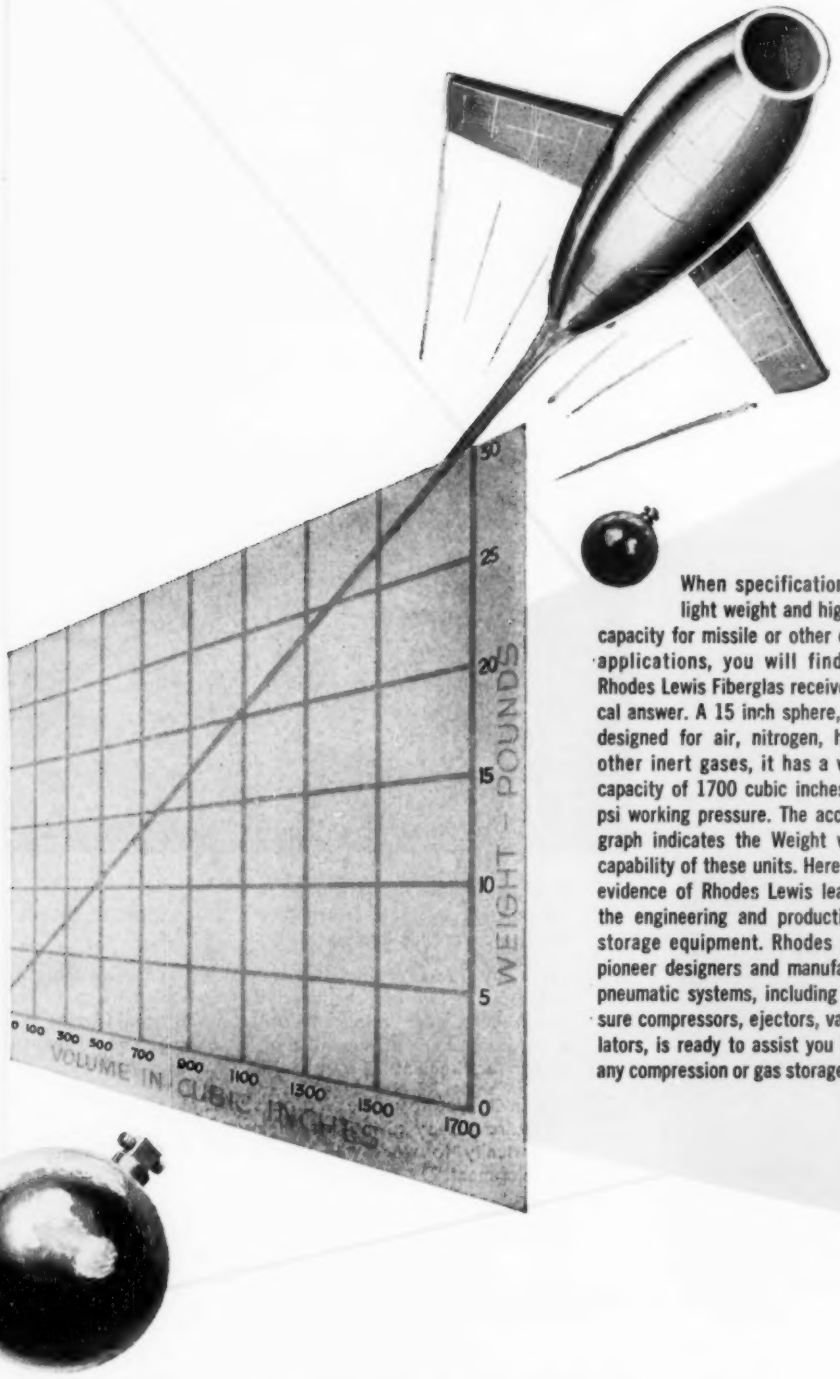

When specifications call for light weight and high pressure capacity for missile or other expendable applications, you will find the new Rhodes Lewis Fiberglas receiver the logical answer. A 15 inch sphere, especially designed for air, nitrogen, helium and other inert gases, it has a volumetric capacity of 1700 cubic inches for 3000 psi working pressure. The accompanying graph indicates the Weight vs. Volume capability of these units. Here is striking evidence of Rhodes Lewis leadership in the engineering and production of gas storage equipment. Rhodes Lewis Co., pioneer designers and manufacturers of pneumatic systems, including high pressure compressors, ejectors, valves, regulators, is ready to assist you in meeting any compression or gas storage problems.

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two cities. In most cases, this path is the fastest route between two points. But, due to restricted defense areas, it not always is possible to use this route. As a result, the computed track is compared with authorized routes to determine the fastest course.

• Next, the second or "template" method is employed to determine the "net wind component" over the proposed route, measuring the effect the wind will have on the aircraft. This component is compared with those over the Great Circle and various other authorized routes with relation to distance and time. The result is the fastest time track.

• The wind at various altitudes then is related to aircraft performance at those altitudes, and the best altitude from the standpoint of time is selected.

▶ **Fastest Route**—Approximately three hours prior to flight time, meteorologists and dispatchers at TWA's three dispatch centers—Los Angeles, Kansas City and New York—discuss possible routes and weather conditions over the airline's private line. Should the fastest route appear impractical from a weather standpoint, the second-best track is chosen.

As flight departure time nears, the dispatcher computes time and fuel load. All pertinent information is available to the pilot on his arrival for briefing. After consultation between flight crew, dispatcher and meteorologist on the final weather path chosen, the crew computes the specific flight plan that they will use.

Work on the ground continues once the aircraft is airborne. Before the flight arrives over the Rockies, meteorologists have examined new wind and pressure information to determine whether the original track still is the fastest. If a slight route deviation will save time, the crew is so advised.

Congress Wants AF To Buy Fewer Spares

Air Force is under heavy pressure from Congress to cut back further on procurement of aircraft spares and parts.

Since Sen. Homer Ferguson, chairman of the Military Appropriations Subcommittee, criticized USAF two years ago for allocating an average 66% of the cost of a plane for spares and parts, USAF has reduced the percentage to approximately 30.

▶ **Reductions Sought**—Hearings before House Military Appropriations Subcommittee developed these three main facts, drawing criticism from congressmen and demands for further reductions in spares buying:

• Of the $27.8 billion that has been appropriated since the Korean outbreak in mid-1950 for complete aircraft and initial and follow-on spares and parts, $11.2 billion has gone for spares and $16.6 billion for complete aircraft.

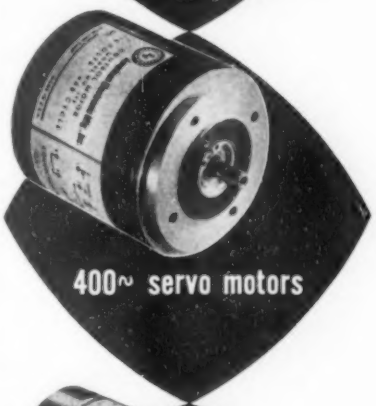
• USAF will have a spares and parts inventory on hand June 30, amounting to $4.6 billion. Even at the high consumption rate of $496 million caused by the Korean war in fiscal 1953, this is more than a nine years' supply. In addition, USAF on June 30 will have $4.6 billion obligated for spares and parts on order.

• The Air Force program calls for a total obligation of $1,742 million for spares and parts in fiscal 1955, compared with $2,360 million for complete aircraft. This is the first time USAF's total spares and parts purchasing program, made under four different budget categories, has been brought to light.

Under "aircraft and related procurement" USAF plans to obligate $1,037 million for initial spares and parts and $180 million for modification of in-service aircraft. Under "maintenance and operations" USAF plans to obligate

Commission Inspects AF Academy Sites

USAF Secretary Harold Talbott (third from right) with the five-member commission he chose to study nearly 400 suggested sites for new USAF Air Academy recently approved by President Eisenhower (Aviation Week Apr. 12, p. 7). At Washington National Airport prior to departure on their tour are (left to right): Virgil M. Hancher, University of Iowa president; Merrill C. Meigs, Hearst Corp. vice president; Gen. Carl A. Spaatz, (Ret.), former AF Chief of Staff; Talbott; Brig. Gen. Charles A. Lindbergh, AFR, and Lt. Gen. Hubert R. Harman, special assistant to Gen. Twining.



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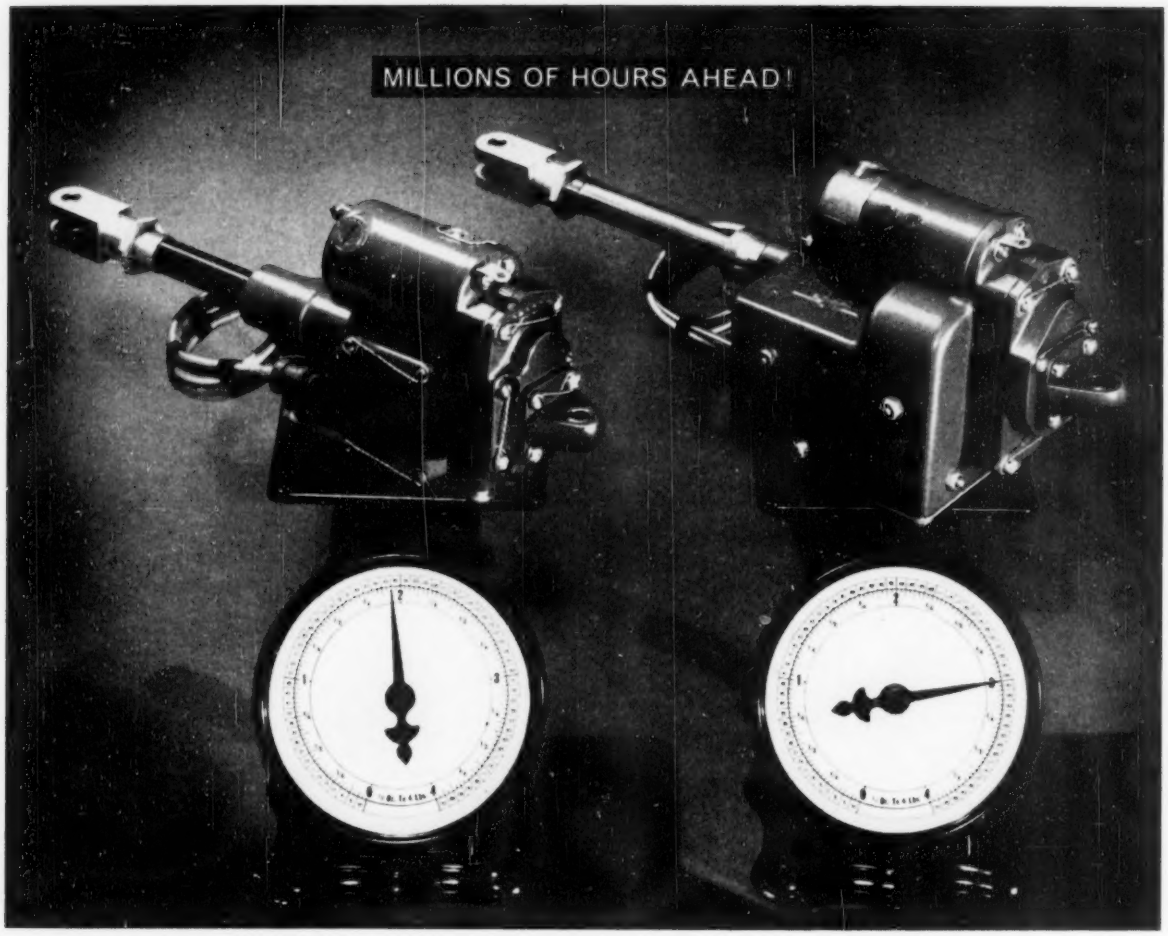

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New, small AiResearch actuator weighs 35% less than old style . . . retains its *high efficiency!* When it comes to equipping a modern jet fighter plane, the saving of an inch of space, or even 17 ounces is *news!*

That's why AiResearch engineers are proud of this new component: a slim, compact linear actuator suitable for thin wing fighter installation. It weighs 35% less than former actuators, with no sacrifice in performance.

New actuator — lighter, smaller:		
	New Model	*Old Model*
Length	11.78 in.	11.78 in.
Width (max.)	1.80 in.	3.10 in.
Height (max.)	3.73 in.	4.49 in.
Weight	31 oz.	48 oz.
Operating load (normal)	500 lbs.	500 lbs.

During more than a decade of leadership AiResearch has compiled over 700,000 research and development hours in this field alone and produced 419,773 actuating units.

These new actuators are another example of how AiResearch achieves ever greater performance from smaller size and weight at lower cost. If you have a problem in any of the fields listed below, consult our engineering-manufacturing team.

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$400 million for maintenance spares and $125 million for "corrective maintenance."

Air Force obligations for spares and parts under these four categories totaled $2,451 million in fiscal 1953 and $1,979 million in fiscal 1954.

▶ **'Miscalculation'**—"I am not a maintenance expert by any means," said Rep. Errett Scrivner, chairman of the House Air Force Appropriations Subcommittee, "but when I go around to some of these depots and see on hand in the warehouses items of spares and spare parts that have not been touched for four or five years, it would indicate that someplace, somewhere, there has been some miscalculation.

"Maybe it cannot be helped. But that is one of the reasons apparently that we are going to be faced with the requirement for so many million feet of storage space for the Air Force.

"If the spares program could be revamped someway where more of your spares could be obtained from current manufacture all of us would be better off. We would not have as much tied up in dead dollars. We would not have as much involved in storage space and its construction, and handling of all those items that go with dead storage and a slow-moving inventory."

Business Flying

Lear Sees 80,000 Planes by 1960

Los Angeles—Business flying will increase at least tenfold in the next decade, with 80,000 company aircraft flying instead of the present 8,000.

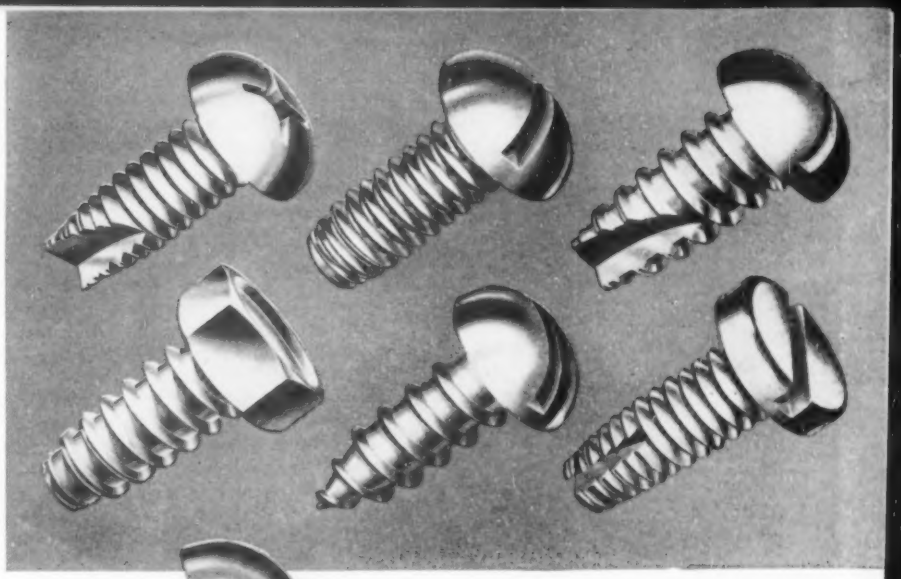
This is the prediction of William P. Lear, chairman of the board of Lear, Inc., who calls it an extremely conservative estimate.

"It could expand 100 times," he says, pointing out that there already are twice as many multi-engined aircraft engaged in business flying in the U. S. as there are in commercial airline operation.

▶ **Greater Profits**—Abolition of the excess profits tax has not meant less interest in business aircraft, Lear told the Chamber of Commerce Aviation Committee, but has increased the interest. Companies now in a position to make greater profits are seeking ways to make their executives more efficient, he says.

Sales inquiries concerning business aircraft have increased at Lear, Inc., since the excess profits tax was dropped Jan. 1, the board chairman reports.

▶ **Sudden Spurt**—Lear says the scarcity in industry of top level executives is one reason for the sudden spurt in popularity of business flying. A company must obtain the greatest efficiency from its executives by literally putting him in



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more than one place in one day. In addition, it also is possible for him to return home each night. "We have held executives as a result of this while other companies lose them," Lear says. His own company operates 15 business aircraft and recently decided to buy two more.

"I'm not against airline travel," he says. "The surface of airline travel has only been scratched. But the man with his own airplane—or airplanes—will have the business edge. He will get there 'fustest with the mostest.'"

▶ **Popularity Boost**—Three technical developments have given business flying a boost that will bring increasing popularity, the aircraft equipment builder reports:

- Twin-engine business aircraft in a lower price range.
- Better instrumentation.
- Automatic pilot.

"An autopilot takes care of the tedious details," Lear says. "The pilot in the plane should be the manager, not the muscle man. A man cannot detect rates of motion continuously hour after hour like an autopilot can."

Lear believes the pilot should exercise only what he calls "management control" of the aircraft. In this way, he is free to detect errors he might otherwise overlook, free to concentrate on navigation and communication.

▶ **Backward Concept**—Lear believes, however, that instrument flying must be made more simple. If inclement weather keeps the business pilot on the ground, he will turn to airline travel. As Lear puts it, "he must be able to go when he wants to go.

"The original concept of instrumentation as presented to the pilot on his panel is all backwards," he says. Lear charges that a gyro instrument in which the horizon bar tilts instead of the airplane is based on technical expediency. "It's the unnatural way," he says, adding that even after 7,000 hr. a pilot still must remind himself that it is the horizon bar, not the airplane, which is moving.

Servo-mechanism developments now make it possible to move the airplane, not the horizon, he declares.

▶ **Around the Corner**—"We believe the way to get business flying around the corner is to get instruments to the point where pilots on instruments will fly better than they do in other conditions," Lear says.

Lear, Inc., now is equipping a Link trainer to test this theory with Lear-developed instrumentation, the board chairman reveals.

"We think we can teach anyone from 11 to 75 with reasonable intelligence to

Civil Plane, Engine Shipments

Civilian aircraft shipments during January amounted to 278 planes valued at $24.3 million, compared with shipments of 365 planes valued at $17.7 million for the same month last year.

Measured by airframe weight, shipments were 909,400 lb. in January 1954, which is lower than shipments during the previous two months but approximately the same as those in January 1953.

Unfilled orders for 325 planes were recorded at the end of January 1954, approximately the same as the backlog for the previous month.

The breakdown:

	January 1954	December 1953	January
Complete aircraft	278	250	365
by weight of airframe:			
Less than 3,000 lb.	254	218	318
3,000 lb. and heavier	24	32	47
By number of places:			
1- to 5-place	253	215	318
More than 5-place	25	35	47
By total rated hp.:			
400 hp. and more	253	215	318
	25	35	47
Value of complete aircraft and parts:			
(000 omitted)	$30,490	$40,938	$25,084
Aircraft total	24,302	32,517	17,744
Less than 3,000 lb.	2,890	2,095	2,772
3,000 lb. and heavier	21,412	30,422	14,972
Aircraft parts	6,188	8,421	7,340
Value of aircraft engines, parts:			
(000 omitted)	11,405	12,909	10,896
Aircraft engines	4,840	6,892	3,657
Engine parts	6,565	6,017	7,239
Unfilled orders (number of planes 3,000 lb. and heavier)	325	322	412

SOURCE: Department of Commerce.

hold level, make a letdown, take a heading, with only 5 min. training," Lear says.

Tests will be run with 11-year-old boys and girls, with 75-year-old grandmothers, and with rated pilots, both those experienced in instrument flying and those who are not.

It will be possible to mask out Lear instruments to record tests with conventional instruments for purposes of comparison.

Noting that conventional rate-of-climb indicators have a 10-sec. time lag, Lear remarks: "It is perfectly easy to design an instrument with a servo-mechanism that will wipe out that time lag.

"Those are the kind of things we have to do to get business flying around the corner," he concludes.

Johnson Says CRAF Cuts Defense Costs

"No concept of military strategy can be called truly modern unless it encompasses the relationship of the commercial air fleet to the military establishment," says Earl D. Johnson, president of Air Transport Assn.

He reports that scheduled airlines today have earmarked 300 of their four-engine transports with crews and equipment for the Civil Reserve Air Fleet and are ready to operate them for mobilization on 24 hr. notice.

▶ **$300-Million Cost**—"The probable cost to the U. S. taxpayers should the government be obliged to provide these aircraft," Johnson says, "would amount to about $300 million. This does not include the annual cost of spare parts or keeping at peak efficiency the thousands of personnel necessary to operate and maintain those planes, which represents another $300 million."

Scheduled airlines in addition have some 1,000 aircraft available for defense purposes both at home and abroad in case of extreme emergency.

▶ **Aid Mandatory**—Johnson predicts that by 1970 some 68 million domestic passengers will be flown annually, compared with 28 million in 1953. These same estimates envision a cargo airlift in 1970 of more than a million tons," dwarfing the tonnages lifted in 1953," he says.

Johnson says the cost of maintaining the competitive position of scheduled U.S. international carriers" is so high that government aid has been and will continue to be mandatory, particularly in view of the necessity to maintain a worldwide network of air routes in the interest of national defense."

Between now and January 1956, says Johnson, "$300 million in new equipment will be delivered and debited for eventual writeoff, in the airlines.

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customarily reserved for
close tolerances,
is standard procedure
with Cooper craftsmen,
procedure that insures
greater uniformity for all
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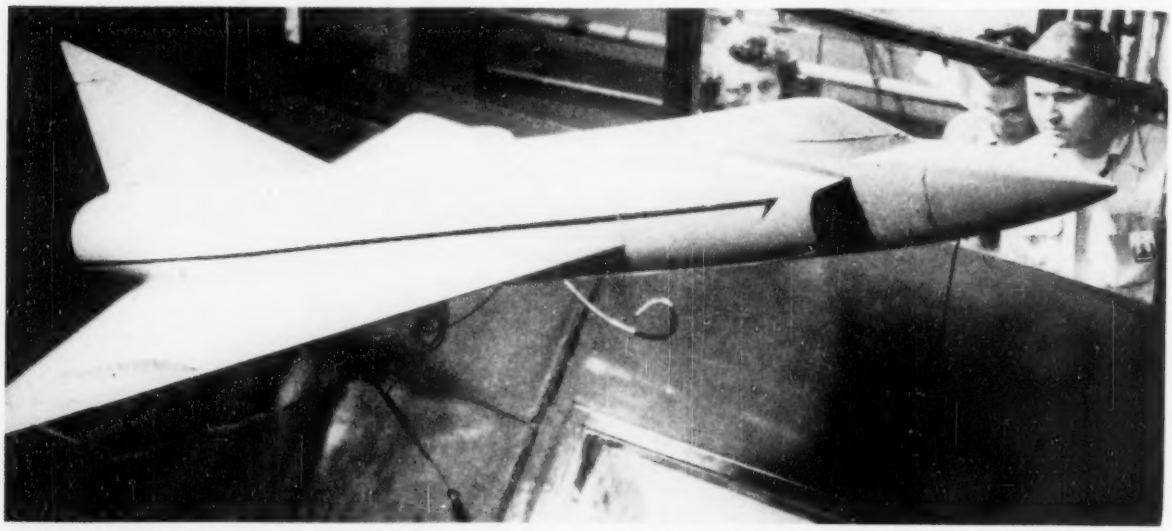
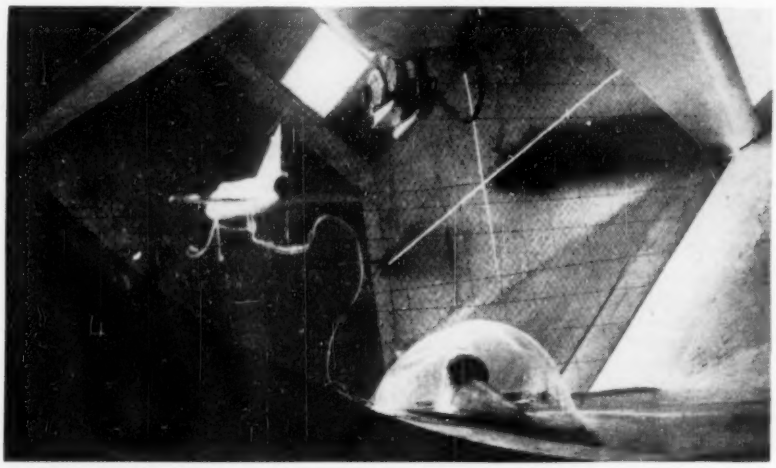
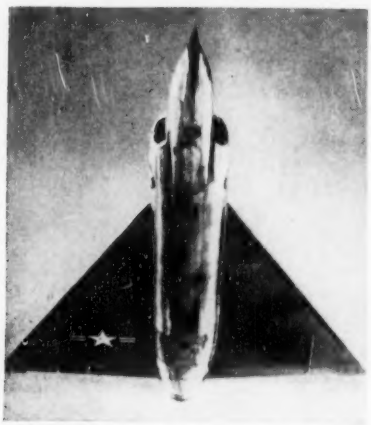


SCALE MODEL of the Convair F-102 delta-wing supersonic interceptor is shown flying in test section of NACA freeflight tunnel.

F-102 MODEL mounted for force test.



PILOT FLYING F-102 model remote control is under plastic canopy in foreground.



DELTA in the sky. Convair's supersonic interceptor caught in flight.

F-102 Flying Model Helps NACA Study Delta-Wing Configuration

Typical of development work done by National Advisory Committee for Aeronautics on new models of highspeed military aircraft, in addition to its basic mission of aeronautical research, is the testing of a one-tenth scale model of the Convair YF-102 in the freeflight windtunnel at the Langley Laboratory.

The scale model of the YF-102 delta-wing supersonic interceptor is shown being flown in remotely controlled free flight at the Langley tunnel to determine stability and control characteristics during the critical lowspeed periods just after takeoff and during approach for landing.

Among the recent specific contributions of NACA windtunnel work to new military supersonic fighters are the use of chord extension of leading edges of the wing for better lowspeed flight characteristics on highspeed wings; the lowering of the horizontal tail surface close to the bottom of the fuselage to combat highspeed "snaking"; inboard ailerons; and more efficient air intakes.

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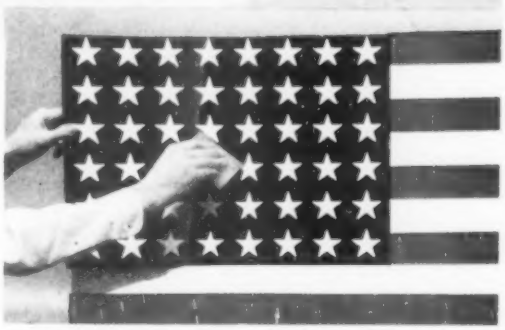

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TYPE R-149

EEMCO's unique Type R-149 linear actuator is entirely self-contained; the motor, clutch, planetary reduction gear and limit switch are all enclosed within the smaller inner cylinder. Type R-149 has an unusually long stroke of 9.625" at .3" per second under a normal load of 4000 lbs. on a 28 volt DC system. Maximum operating load is 8000 lbs., maximum static load, 15,000 lbs. EEMCO's compact Type R-149 has adjustable load limit switches, non-jamming end stops, and a motor that shuts off automatically when end stops are reached, or load exceeds a pre-set limit. Weight is 10 lbs., 5 oz.

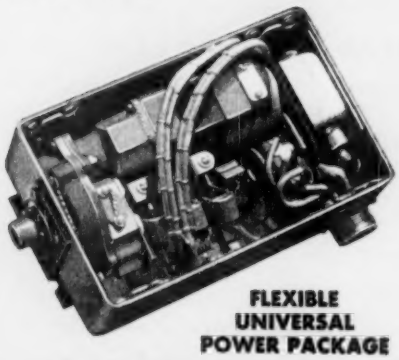
Need Special LINEAR ACTUATORS?

EEMCO can save you valuable development time and expense and speed the delivery of actuators by altering one of its many tested and proven linear models to fit your specific need.

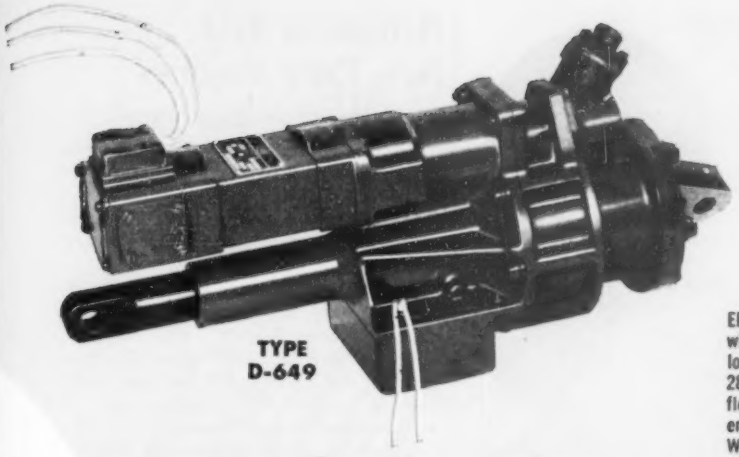
Shown here are a few of many EEMCO self-powered and remote-controlled mechanical linear actuators that have been designed, developed, tested and produced for various air frame manufacturers. There is a definite possibility that one of the actuators illustrated (or others not shown) can be adapted to <u>your</u> specific need as to load, length of stroke, rate of travel, or other characteristic.

Illustrated at right is a group of EEMCO actuators designed for aileron, elevator and trim tab controls. Powered by the EEMCO Universal Power Package they can be operated singly or in groups to actuate systems — a cowl flap for example. These and many other custom designed EEMCO linear actuators can be adapted for specific purposes with a minimum of expense and delivery time.

EEMCO's flexible Universal Power Package drives single or multiple screw jack actuators, either rotary or linear (some of which are illustrated at right), with direct or flexible shaft connection for remote operation. This compact 3⅜ lb. power package is only 7⅛" x 4⅞" x 2¾" in size yet contains motor, radio noise filter, magnetic clutch and brake, reduction gear and auxiliary gears operating adjustable limit switches to control travel, light switches and position indicator. Specifications can be changed to suit special requirements.

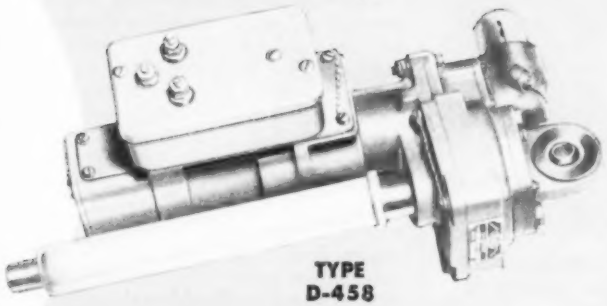


FLEXIBLE UNIVERSAL POWER PACKAGE



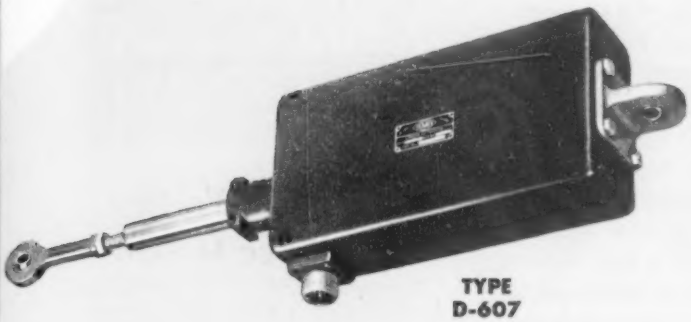
TYPE
D-649

EEMCO's Type D-649 linear actuator weighs 13.75 lbs., and operates with a stroke of 3 1/16" at .55 inch per second under a working load of 3400 lbs. normal tension and 8200 lbs. peak tension on a 28 volt DC system. Maximum static load is 18,750 lbs. It has a flexible shaft drive take-off, load limit switches, non-jamming end stops and a retraction stop that adjusts to within ¼ inch. With minimum expense and delivery time EEMCO's Type D-649 can be supplied for various loads, lengths of stroke, rates of travel and other characteristics.



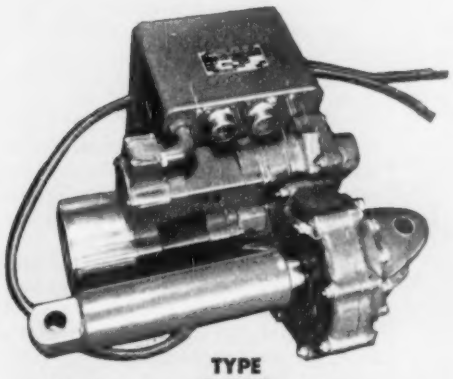
TYPE
D-458

EEMCO's Type D-458 linear actuator for jet wing flaps weighs 8 lbs., 3 oz., has a stroke of 5.14" at .4" per second on 28 volt DC system under a normal load of 3000 lbs. Ultimate static load is 10,000 lbs. compression in fully extended position. Type D-458 has non-jamming end stops, provision for power take-off or hand drive (right angle) and radio noise filter. Load, stroke, rate of travel and other features of EEMCO's Type D-458 can be changed to suit specific needs in a minimum of time.



TYPE
D-607

EEMCO's Type D-607 is a door actuator for transport aircraft which weighs 4.5 lbs. and has a stroke of 6.25 inches. Linear rate of travel is .33" per second at the rated load of 450 lbs. compression. Ultimate static tension load is 7000 lbs. EEMCO's Type D-607 has non-jamming end stops, adjustable travel-limit switches, radio noise filter and operates on a 28 volt DC system.



TYPE
R-129

EEMCO's Type R-129 is a stabilizer actuator for large jet fighters. It is a complete actuator assembly incorporating two motors, 1/10 hp and 3.3 hp, operating through gear reductions to give a drive rate of 6/100" per second and 7/10" per second respectively to the screw jack. Normal operating load is 11,000 lbs.; static load is 80,000 lbs. The small motor operates almost continuously with automatic pilot, while the larger motor provides for manual pilot control at a higher rate of maneuvering. Type R-129 operates on a 28 volt DC system, has overload and limit switches, radio noise filter, position indicator, non-jamming stops. Weight, 45 lbs.

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motors, linear and rotary actuators.

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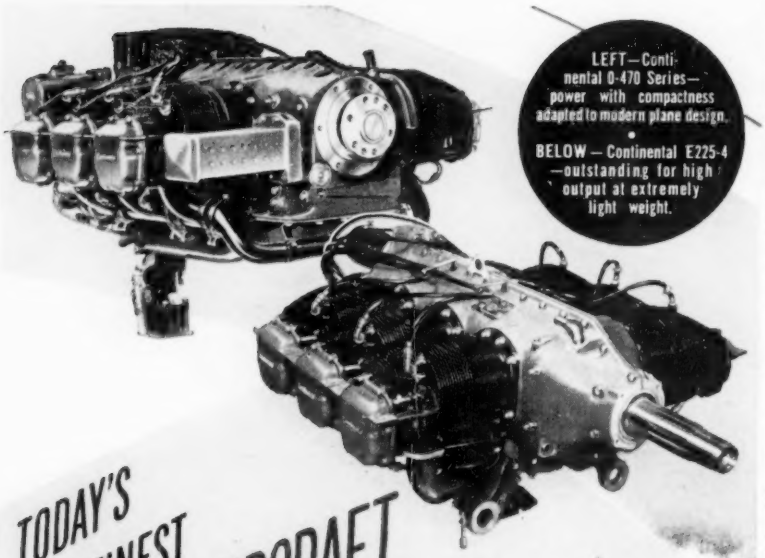
EEMCO can supply a linear actuator to fit *your* specifications



LEFT—Continental O-470 Series—power with compactness adapted to modern plane design.
•
BELOW—Continental E225-4—outstanding for high output at extremely light weight.

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Continental Motors Corporation
Aircraft Engine Division
MUSKEGON, MICHIGAN

British to Test New Prop Engines

(McGraw-Hill World News)

London—Three new propeller-type engines will be tested aloft by the British this year. One is a turboprop, one a composite piston-turbine engine and the other a piston powerplant. These are the engines:

• **Turboprop Napier Eland**, designed for 3,000 ehp. will be flown on a twin-engine Vickers Varsity. The Varsity, which is an RAF crew trainer development of the Viking civil transport, normally is powered by piston engines.

• **Composite Napier Nomad** is a 12-cylinder compression-ignition engine supercharged by an axial-flow compressor and coupled to an exhaust gas turbine. Power from the piston section and excess power from the turbine are absorbed by a single-rotation propeller. The Nomad is designed to produce 3,135 ehp. and weighs 3,580 lb. dry. Low fuel consumption is a key feature of the Nomad. Two Nomads will be mounted in the outer nacelles of a four-engine Avro Shackelton maritime reconnaissance plane. The inner nacelles will house the Shackleton's normal Rolls-Royce Griffon piston engines.

• **Piston Alvis Leonides Major** delivers 870 bhp. at takeoff. Production versions are slated for the new Bristol 173 feederline helicopter and Handley Page's new H.P.R. 3 four-engine transport, of which three prototypes are being constructed.

How Human Factors Affect Plane Design

Increasing emphasis on the human factors in aircraft design has been underlined by the recent publication of "Frontiers of Man-Controlled Flight," the proceedings of a symposium convened in Los Angeles in April of last year.

The symposium was suggested by Dr. J. R. Poppen, chairman of the Aero-Medical Engineering Assn., and sponsored by the Institute of Transportation and Traffic Engineering of the University of California jointly with the Los Angeles section of the Institute of the Aeronautical Sciences.

Eighteen papers were presented and are reprinted in the proceedings, including thoughts on future performance of aircraft by Edgar Schmued, Northrop's vice president-engineering, and viewpoint of the military test pilot by Maj. Charles E. Yeager.

The proceedings are illustrated, indexed and paper-bound. They may be purchased for $2 from the University of California Press, Berkeley 4, Calif.

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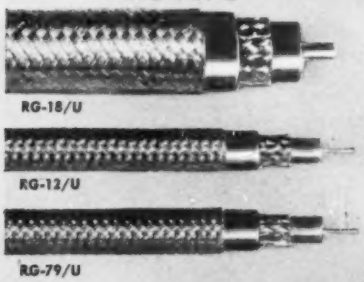

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YOURS FOR THE ASKING: Federal's new 28-page buying guide contains a world of information on Federal quality-controlled wires and cables, plus numerous tables and diagrams. For your free copy write to the department above.

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In aviation, industry, broadcasting, TV, test, experimental, pulse or special purpose . . . for HF, VHF or UHF anywhere . . . you'll find the best in *quality* and *performance* in Federal's RG types. Write us today about your specific requirements, to Dept. D-1110.

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• The JETCAL *quickly* tests the exhaust gas temperature (EGT) thermocouple circuit of a jet aircraft or pilotless aircraft missile for error *without running the engine or disconnecting any wiring.*

The JETCAL also has these corollary purposes:

A) To isolate errors in the EGT system.

B) To check thermocouples for continuity.

C) To be used in "tabbing" or "micing" . . . and to give accurate temperature readings for checking the setting of fuel control or automatic nozzle area openings.

D) To check the thermocouple harness ring on the engine before its installation in the airframe.

E) To separately test the EGT indicator using the potentiometer and special circuit of Jetcal

F) To functionally test overheat detectors and wing anti-ice systems (thermoswitches) by using TEMPCAL* Probes.

JETCAL Tester is guaranteed accurate to ±4°C. at engine test temperature.

Now used by U. S. Navy and Air Force as well as by major aircraft and engine manufacturers.

• The production or maintenance engineer, pilot and *cost accountant* will readily assay the safety and savings factors resulting from Jetcal use. *We invite inquiries concerning the Jetcal Tester . . . and will be glad to have our engineering department help solve your heat problems.*

*Available separately at extra cost.

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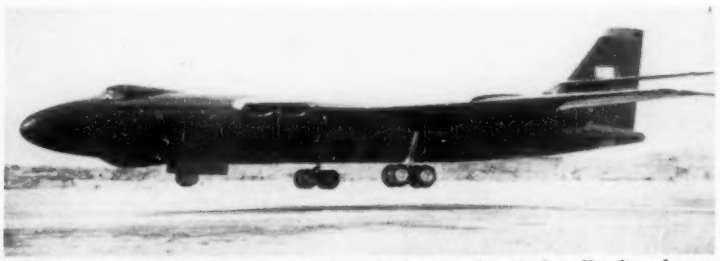
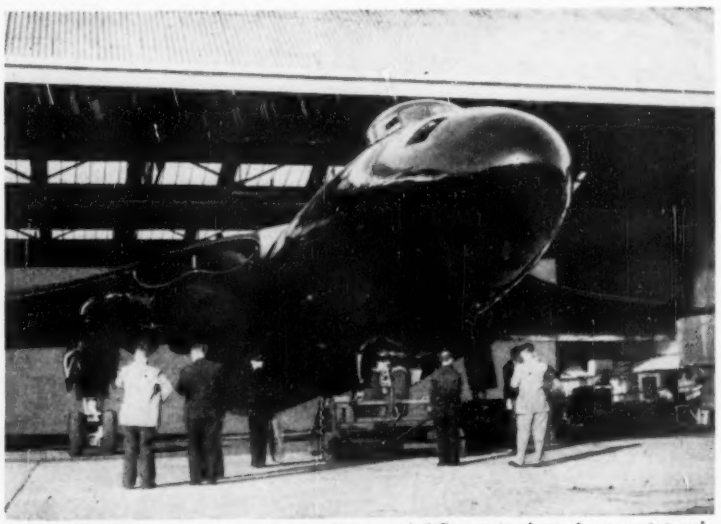
Aviation Week Picture Brief

NACELLES for new rearward retracting landing gear trail behind wings of Vickers Valiant model B-2 bomber. Wheels folded outwards on prototype.

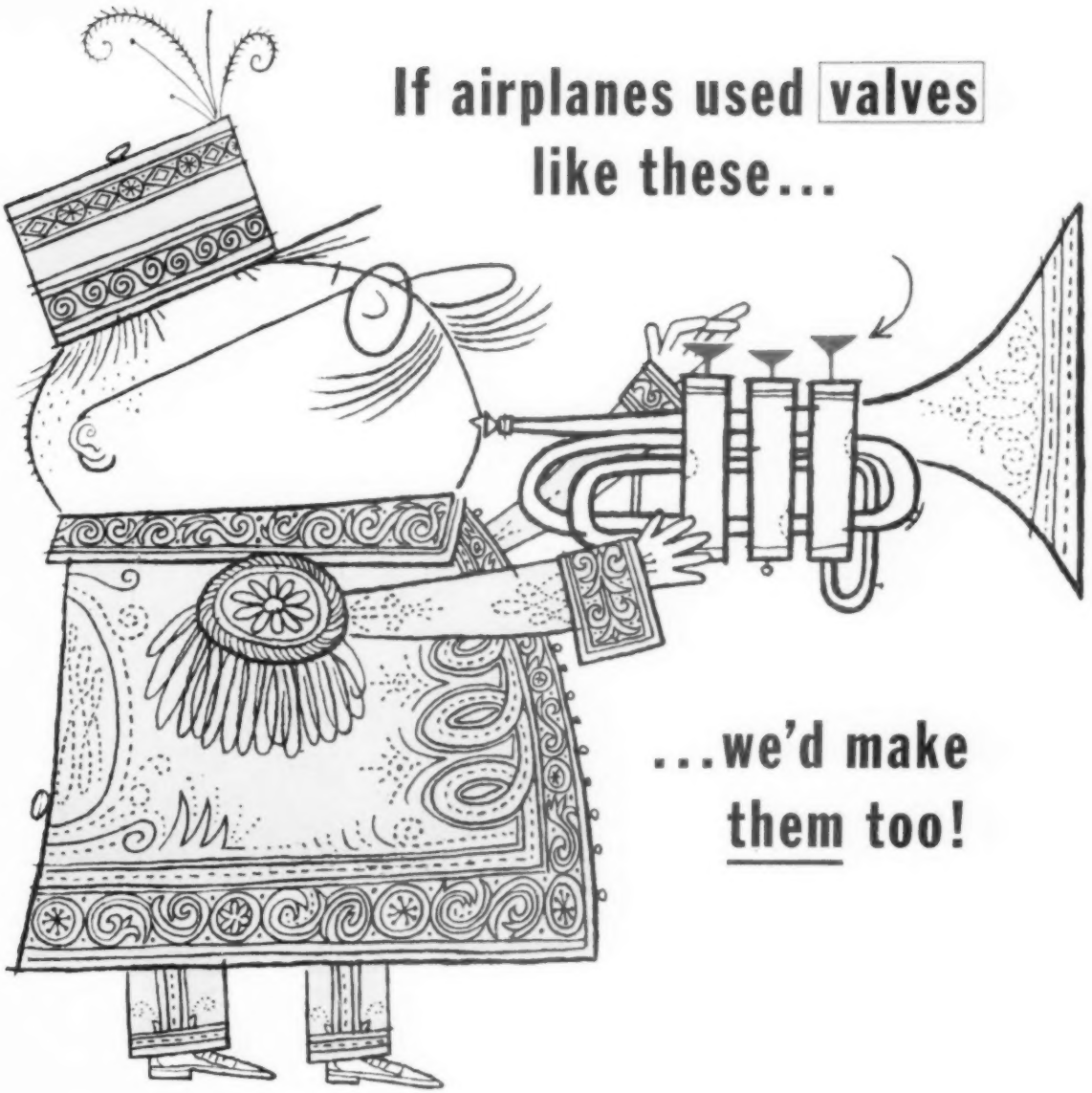
RAF Valiant Shows Changes



BOGIE LANDING GEAR has four wheels on each main leg. Fuselage, longer than prototype's, has been extended, apparently by adding section ahead of wing.



JET INLETS for Avon engines are larger and different in shape from prototype's. Reports say RAF prefers prototype, as gains from modifications were slight.



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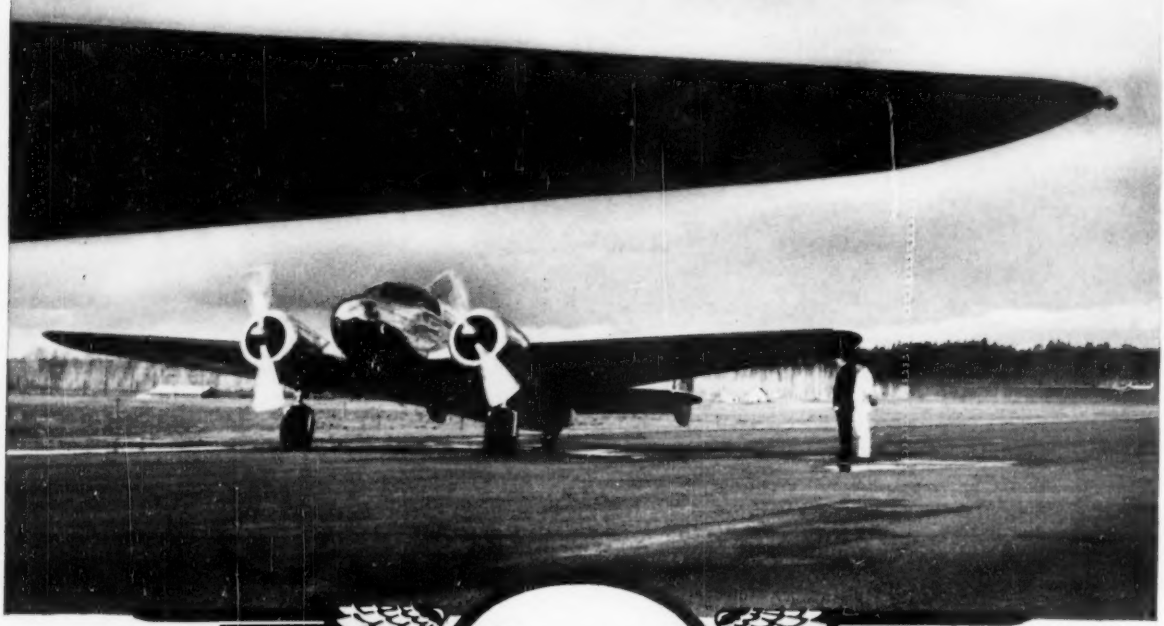
Business is rising to the challenge...



Lockheed Electra

Today, success in business means getting there *first* with the *most*. That's why more and more smart businessmen are meeting the challenge of getting more done in less time by flying their own or company planes.

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AVIATION PRODUCTS

Martin Plugs Industry Role in Education

The relationship between industry and engineering colleges has got to travel on a two-way street, says the Glenn L. Martin Co.

It is not enough to make an annual recruiting visit or to donate some money, the company feels. Instead, industry must be available for advice and help whenever possible.

Martin's plan for doing this is believed to be unique in the industry both in scope and breadth of operation. It is built around a large group of hand-picked college representatives as ambassadors and for liaison.

This is the way the Martin company plan works:

▶ **Engineering Visitors**—The company has selected a large number of its key engineers to act as college representatives to the schools from which they graduated. The men are chosen from graduates who have been out of school long enough to appreciate the value of their education, but who are young enough to retain personal friends on the faculty.

During the school year, each man makes at least two visits of about three days at a time. The first visit is during the fall semester, and is preceded by letters from the representatives to key members of the faculty.

At the college, the Martin engineer may give technical lectures on specific phases of his work. Other Martin engineers may be along on the trip to give similar lectures on other phases, if the college wants this done.

The representative may be asked to take over instruction of a class; he may be invited to talk to student groups in the evening, either on a formal or informal basis.

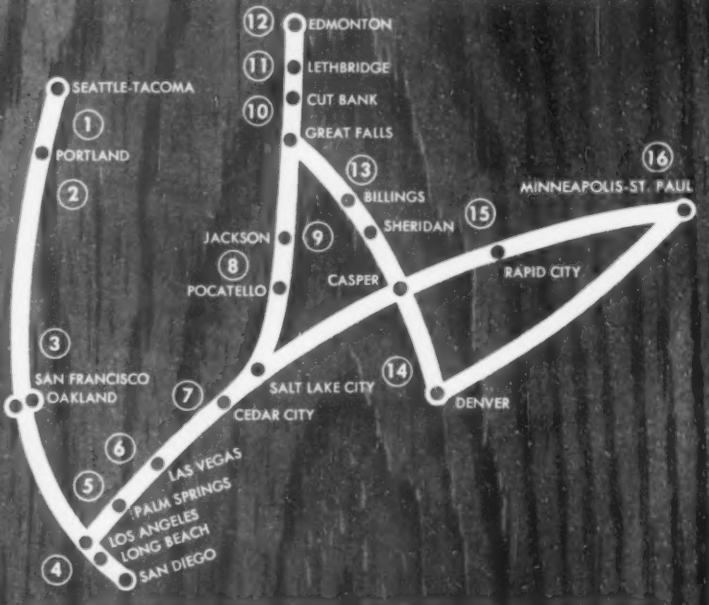
He meets with his faculty friends and the instructors and professors to discuss problems, new concepts, methods and applications of theory as used in industry.

During the visits, and afterwards, he

"It's Brown I'm worried about. He's wizard in the air, but hopeless on the simulator."

Flight, Great Britain

Your Skyway to Western Vacationlands



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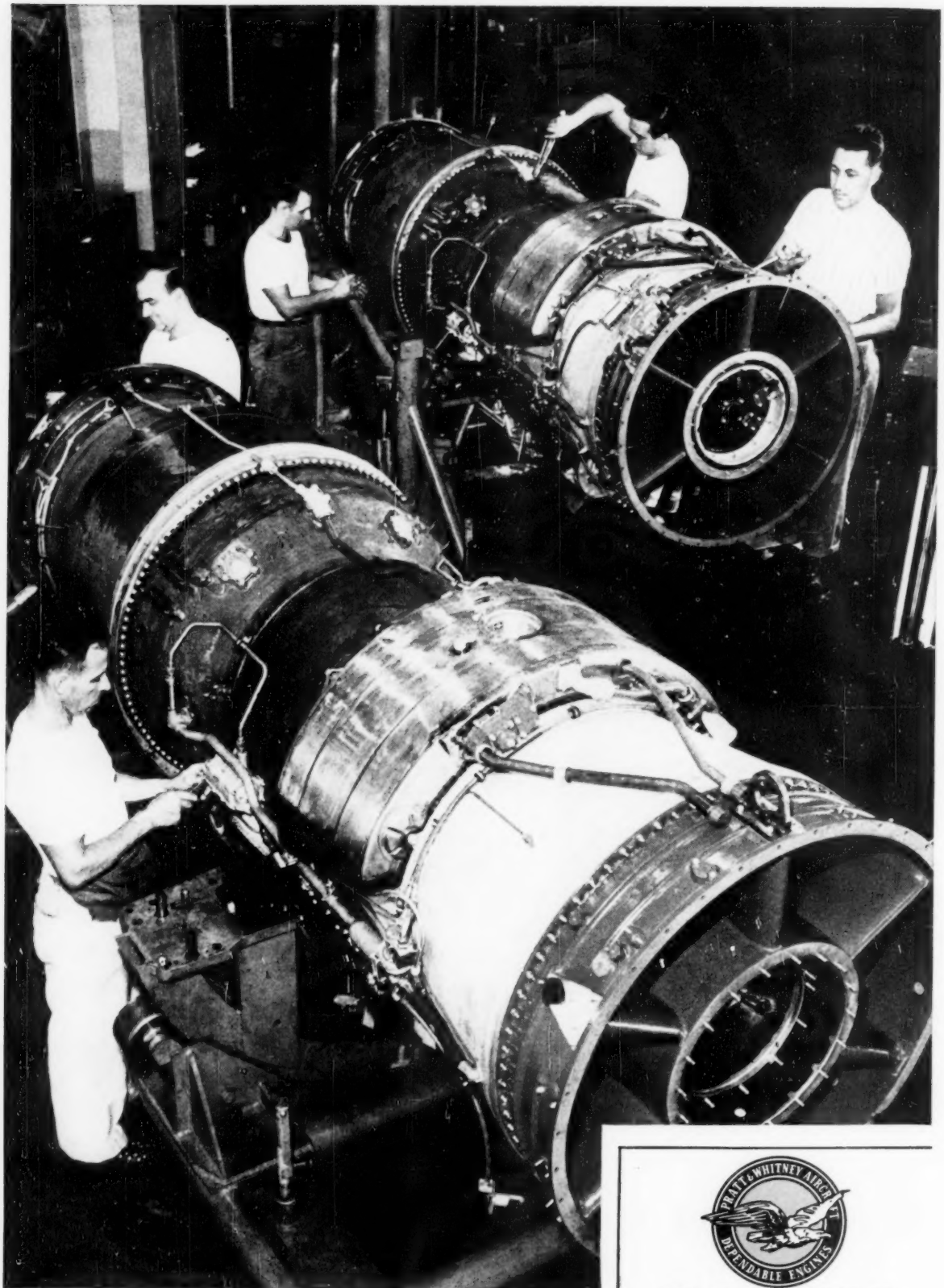
8. Sun Valley
9. Yellowstone and Grand Teton National Parks
   Jackson Hole Dude Ranches
10. Glacier National Park
11. Banff and Lake Louise
12. Jasper National Park
13. Montana-Wyoming Dude Ranches
14. Rocky Mountain National Park
15. Mt. Rushmore and Black Hills
16. Minnesota's "Land O' 10,000 Lakes"

WESTERN AIRLINES

America's Oldest flies America's Finest



Pratt & Whitney Aircraft's J-57, the most powerful jet in quantity production, provides a new kind of power for the F-102 and for a whole generation of aircraft.

PRATT & WHITNEY AIRCRAFT
DEPENDABLE ENGINES

ONE OF THE DIVISIONS OF
UNITED AIRCRAFT CORPORATION

Sun glints from the canopy of this F-102, prototype of the first delta-wing, all-weather interceptor. It was designed and built for the U.S. Air Force by Consolidated Vultee Aircraft, and is powered by the Pratt & Whitney Aircraft J-57 with afterburner.

New Convair Interceptor Now Being Proved in Flight

The Convair F-102, an interceptor with a "new look" and powerful capabilities, is being proved as another major addition to America's vital air strength.

In reality, the F-102 is a new Air Force weapons system. To design and develop it, Convair utilized a unique combination of delta-wing aerodynamics, advanced electronics, ultra-modern fighter armament, and the most powerful turbojet engine now in quantity production, the Pratt & Whitney Aircraft J-57.

Excellent rate of climb as well as phenomenal speed in level flight are two of many significant F-102 characteristics which foretell its important future role in this nation's air defense. Here the huge thrust, fast acceleration and economy of the big J-57 make vital contributions to the aircraft's total capability as a weapons system.

In the F-102, as in other Air Force and Navy supersonic fighters and all-jet bombers, performance of Pratt & Whitney Aircraft's J-57 is fully justifying the years of intensive effort required for its design, development and production.

Pratt & Whitney Aircraft

MAIN OFFICE AND PLANT: EAST HARTFORD, CONNECTICUT • BRANCH PLANTS: NORTH HAVEN, SOUTHINGTON, MERIDEN

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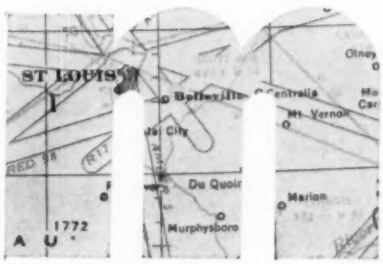
To implement this final link in CAA's common system of VHF navigation, Narco introduces its Model UDI-1 Distance Measuring Equipment for commercial and corporate aircraft use.

Perfected after years of exhaustive development under CAA/ANDB sponsorship, this new Narco DME is built to full air transport standards and has many exclusive features such as crystal-tuning.

This fine, new airline-tested DME, introduces Narco's new Sapphire line of navigation and communications equipment designed to the highest possible electronic standards unsurpassed for reliability and performance.



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- **Unitized construction for efficient servicing**
- **Backed by a nationwide network of especially-equipped DME service centers**

Weighing less than 33 pounds, Narco DME equipment consists of a remote unit mountable on a standard ½ ATR rack, a channel selector, and panel-mounted instrument which indicates distances in two ranges 0-200 miles and 0-20 miles.

SEND TODAY for new brochure describing the Narco UDI-1 DME.

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NATIONAL AERONAUTICAL CORP.
Ambler, Pennsylvania

is available to faculty and student groups for discussion.

▶ **Company's Part**—When the engineer gets back to Martin, he writes a report which details any specific requests for assistance made by the college. When security permits, Martin fills these requests. They may ask for windtunnel models, surplus tools, technical reports, thesis material, movies or display pictures.

If there are specific requests for lectures, they are arranged for a future visit; the lectures to be given are screened so that they deal with the desired subject. They refrain from recruiting propaganda.

Short articles by top Martin engineers are also sent to educators at intervals to familiarize them with trends in Martin's technology.

Letters maintain contact between school and engineer, and repeat visits are used where necessary. In the spring semester, the representative returns to his alma mater.

There is one tabu in the discussions: Martin feels very strongly that industry should not advise changes in college curricula. Instead, says the company, the real theme of its plan is reciprocity, to effect, through personal contacts, a broader exchange of techniques and applications between industry and engineering colleges.

THRUST & DRAG

Of all the unfortunate phrases ever associated with aviation, "death ceiling"—attributed to BOAC chairman Sir Miles Thomas in connection with the recent Comet disaster—must stand at the top of the list.

Aside from its semantic sloppiness—because death is certain and has no ceiling limitation—it's a damning phrase, and one that must have been voiced without thought, on the spur of the moment.

The implication of the words was intended to be that there is some mysterious altitude effect which shows up when a Comet has climbed for half an hour after takeoff from some airport. If this is so, then:

1) Why haven't all Comets been victims of this malady?

2) Why is the altitude effect restricted to locations outside England?

3) Why hasn't the same misfortune happened to other Comet operators?

4) Why can any jet aircraft—British, U. S. or Russian, military or commercial—climb successfully above that "ceiling"?

There is a pattern to the Comet accidents, but its shape is not a function of the atmosphere or altitude alone. To Sir Miles goes the Induced Drag Coefficient of the Week for selecting the worst possible phrase at the worst possible time.

* * *

Minor complaint: Can't we replace the words "pitot tube" by "airspeed tube"? You know what happens at the printers. "Pilot tube," every time.

* * *

When the papers reported that General Motors' Starfire experimental gas-turbine automobile had rolled off the track, I assumed that GM had forgotten to copy the ailerons of the Douglas F4D Skyray which was the design inspiration for the body lines.

But I saw the photos, and I was wrong. They did include ailerons. Now the only alternative is that it was some highspeed instability due to cross-coupling between roll and yaw.

Has General Motors' research department looked into this angle? —DAA

British Test Robot Landing Aid

A new mechanical system designed to guide jet planes to safe landings on carrier decks by day or night is being tested by the British Royal Navy. The device may replace the familiar landing signal officer who uses colored or lighted "bats" to advise pilots of necessary corrections they must make as they near the flight deck.

The device was developed because highspeed approach experiments by the British have proved that too slight a margin exists between the human reactions of pilots and landing signal officers.

Inventor is Cmdr. (Engineering) H. C. N. Goodhart, RN, a qualified test pilot, who also assisted in development of the angled deck concept for carriers.

Development has been carried out by a Ministry of Supply team headed by D. Lean, senior scientific officer of the Royal Aircraft Establishment.

▶ **Robot Details**—The new landing aid incorporates a large curved mirror having a line of colored lights on either side (see photo below). A spot of light is projected onto this mirror from the aft part of the carrier. By keeping the spot of light aligned with the horizontal row of colored lights, the pilot is assured of making the proper approach. The mirror's curvature makes it possible for the pilot to pick up the lights as he comes around for a landing and before he lines up with the deck.

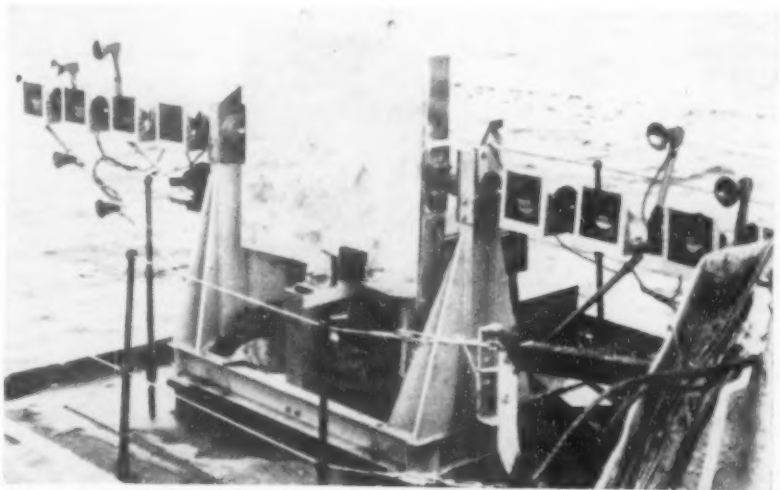
The "robot" LSO is mounted on a gyro-operated mount developed by Royal Navy gunnery experts to keep the mirror at an angle constant to the line between ship and horizon.

The vertical angle of the device can be varied depending on the airplane being landed so that the particular aircraft's landing gear will be at precisely the right height above the carrier's stern prior to touchdown.

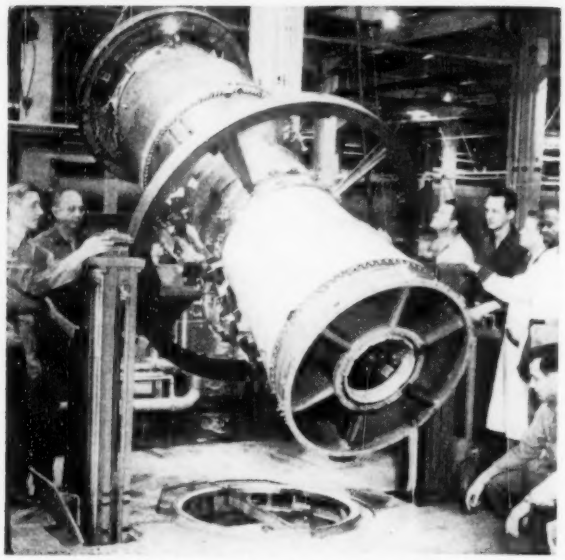
▶ **Cockpit Aid**—Since the pilot cannot divert his attention from the new landing aid to check his cockpit instruments to see if his approach speed is correct, this information is depicted by red, yellow or green lights. They are actuated by the airspeed indicator, reflecting onto a special translucent screen mounted on his windshield.

The British have conducted hundreds of test landings by day and night of the new system; the initial night landings were made by two pilots who had never landed on a carrier at night before, officials note.

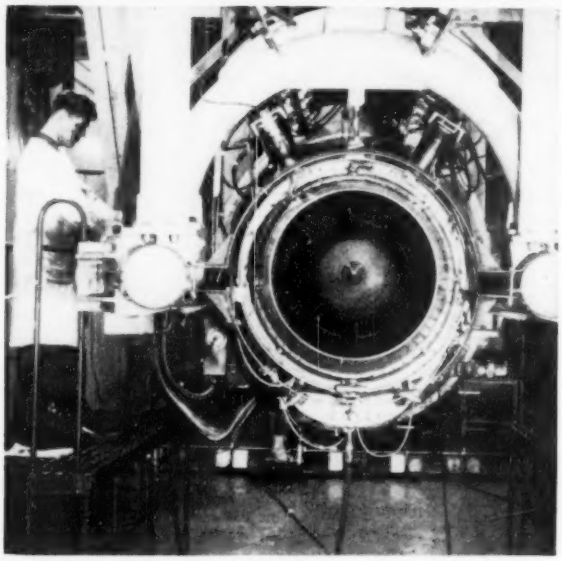
Tests were made on the HMS Illustrious and HMS Indomitable by approximately 20 pilots.



ROBOT SIGNAL DEVICE, showing large curved mirror and lights, aids in carrier landings.

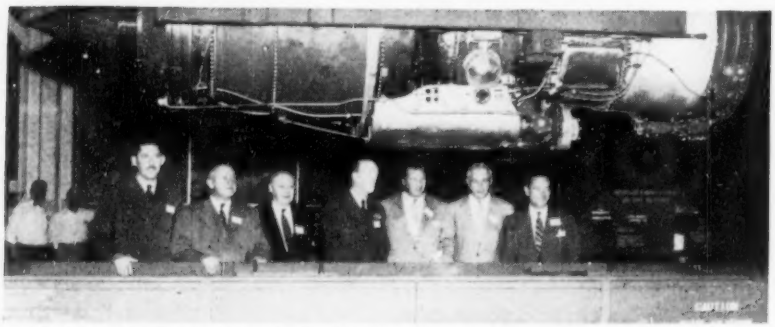


FORD-BUILT J57 is rotated off vertical assembly station.

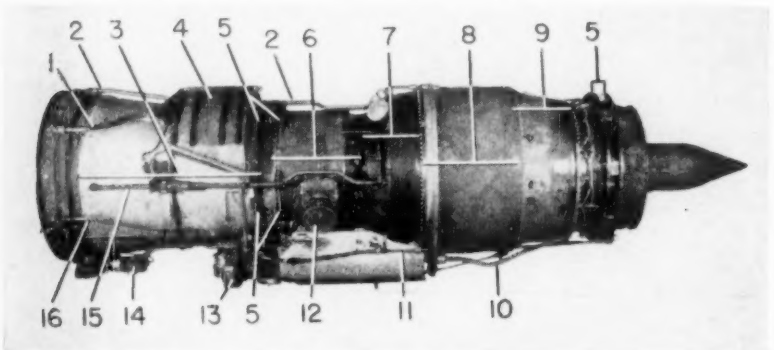


HOT-END of J57 in Ford test cell shows last-stage buckets.

Ford Beats Schedule on J57 Delivery



FORD'S FIRST production J57 is readied for shipment in presence of officials.



SIDE VIEW of Pratt & Whitney Aircraft's J57 dual-compressor turbojet reveals details of the 10,000-lb.-thrust-class engine: 1, oil return line; 2, breather line; 3, low-pressure compressor section; 4, oil tank; 5, engine mounting flanges; 6, high-pressure compressor section; 7, diffuser section; 8, combustion chamber; 9, turbine section; 10, thermocouple harness; 11, oil scavenge line; 12, intercompressor bleed valve; 13, anti-windmilling brake; 14, inter-compressor bleed valve governor; 15, anti-icing air line; 16, oil line. Fairing under the screened bleed valve covers engine accessories.

Ford Motor Co.'s Aircraft Engine division, Chicago, shipped its first production J57 to the Air Force last month, more than two months ahead of schedule. Ford, a prime contractor for the AF, is building the Pratt & Whitney-designed turbojet under a license agreement.

Engine sections are built up at Ford on an elevator platform in a construction well (top left), the engine then taken to a test cell for checkout (top right) before "canning" for shipment (right, center).

► **Makeup Revealed**—Bottom photo shows a P&W-built J57 with some external parts identified. No details of internal makeup have been made available in this country, but the British magazines, The Aeroplane and Flight, have published considerable data concerning the construction of the J57 powerplant.

Industry observers in this country feel that much of this information may have stemmed from a sales brochure for the P&W engine.

► **Compressor Details**—According to the British data, the split compressor of the J57 has a total of 16 stages—nine on the low-pressure rotor, seven on the high-pressure unit, affording a maximum pressure ratio of 12.5 to 1.

The low-pressure rotor is driven by a two-stage turbine on a shaft inside that of a single-stage wheel driving the high-pressure rotor. Turbine blades are shrouded (individual sections) to elimi-

Flexibility in manufacturing to meet rigid schedules

One of America's largest subcontractors, Twin Coach Aircraft Division is probably unique in its flexibility to produce major assemblies for many different aircraft types.

This flexibility—combined with Twin's experienced manpower, modern facilities and equipment—mean Twin can design and build necessary tooling . . . can produce *in quantity and on time* even the most complex major assemblies. Special parts production techniques eliminate delays, keep assembly lines rolling at top speed.

This smooth efficiency is typical of Twin Coach Aircraft Division plants. It enables prime contractors to set and hold to rigid schedules. Investigate Twin Coach Aircraft Division, the dependable source for every type of major airframe assembly.

A-8771

TWIN COACH is currently producing major assemblies for Grumman S2F, AF and UF, Boeing B-52, Piasecki HUP, Republic F-84F, North American F-86, and classified experimental aircraft types.

TWIN COACH COMPANY
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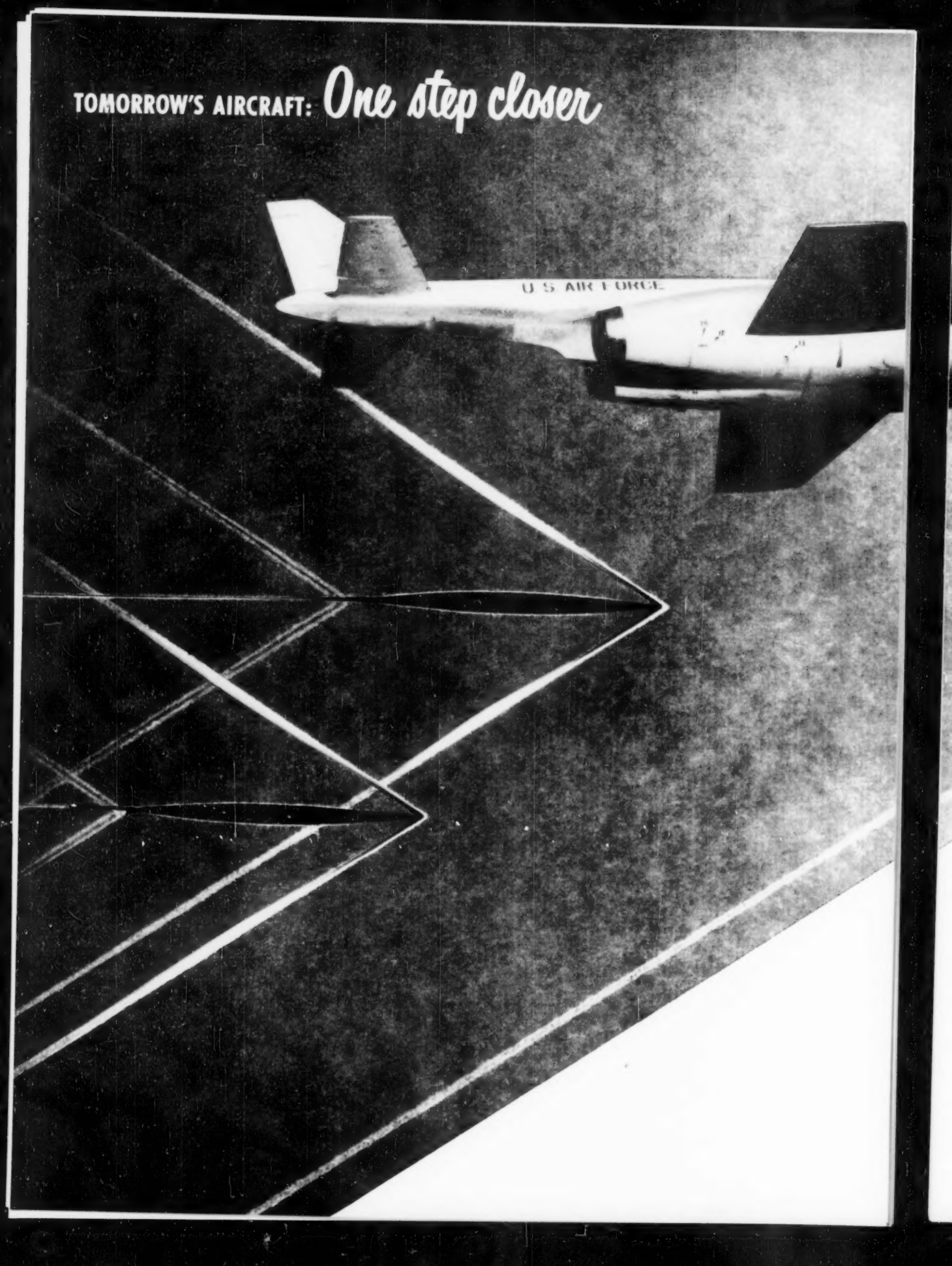
TOMORROW'S AIRCRAFT: One step closer
U S AIR FORCE

Westinghouse Turbojets explore extreme speeds and altitudes ...in X-3 research jet

Pushing further into the realm of supersonic flight, twin J34 turbojets with afterburners are pioneering the use of jet power plants for sustained, high-speed flight.

J34 axial-flow turbojets were chosen to power the X-3 because of important features such as small engine diameter and high thrust-to-weight ratios which permitted the use of two engines to provide excellent high-speed performance combined with multi-engine reliability.

Westinghouse experience and technology are directed at the successful conquest of aviation frontiers. Continuing advancements merit your attention no matter what the aerodynamic design or weapons systems application might be. Let Westinghouse help you bring tomorrow's aircraft . . . One Step Closer. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa. J-91018

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nate leakage over the tips, reduce vibration.

Flight magazine reports that P&W claims that shroud weight is more than offset by the fact that thinner blade sections can be used, which would otherwise be subjected to resonance.

► **Combustion Scheme**—The combustion section—unusually short—encloses eight chambers, each a small annular type fitted with six burners. Cans are constructed of pressed Inconel sheet rings.

Some of the airflow enters through large holes to cool the flame. Boundary layer flows in through slots between the rings to cool the metal. A perforated tube in the middle of each can brings in cooling air to prevent existence of a hot core.

Gas temperature after leaving the turbine section is lower than usual—about 540C. Because of this, more fuel can be burned in the tailpipe of afterburner versions of the J57 than in other comparable installations without exceeding the limiting temperature of the materials, The Aeroplane says.

Steel construction is used throughout the engine, including compressor blading and casings. It is reported that P&W studies showed that titanium alloys could replace steel and save 650 lb. per engine.

► **Specs**—Approximate characteristics of typical basic engine, excluding afterburner, are reported by Flight as follows: Length, 155 in.; diameter, 39 in.; weight, 4,200 lb.; maximum thrust at sea level, 10,000 lb. at specific fuel consumption of 0.78 lb./hr./lb.; typical cruising thrust at sea level, 7,200 lb. with sfc. of 0.759 lb./hr./lb.; maximum thrust with afterburner, slightly in excess of 15,000 lb. Eventual performance of basic engine is reported as 11,000 lb. with sfc. of 0.745 lb./hr./lb.

The J57 is scheduled to be built in several models, with and without afterburner. It is tagged for the Boeing B-52, North American F-100, Convair F-102, McDonnell F-101, Douglas F4D and A3D.

Three "pictures" tell the tale . . . Simply, Accurately!

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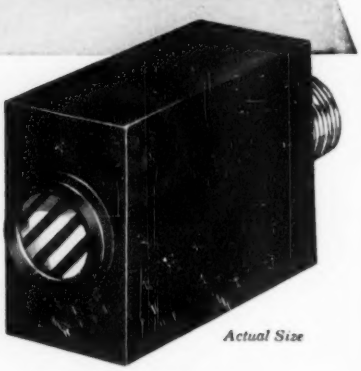

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PRODUCTION BRIEFING

► **Beech Aircraft Corp.**, Wichita, has received a new USAF contract for $4,447,680 covering C-26 jet engine ground power units. The firm recently completed a seven-year Navy twin-engine trainer-transport contract involving rebuilding of 1,246 planes. Last one was an SNB-5 Twin-Beech.

► **Douglas Aircraft Co., Inc.**, has installed a 7,000-ton press at its Long Beach, Calif., plant. Press, costing nearly $800,000 and weighing more than 600 tons, was made by Hydraulic Press Manufacturing Co., Mt. Gilead, Ohio.

► **Rolls-Royce of Australia Pty., Ltd.**, is completing its new plant covering 6.25 acres at Mascot, a Sydney suburb. The facility includes a service workshop and test house for R-R Avon and R-R Dart engines and will be the firm's civil aviation service center for jet equipment in the Southwest Pacific and Far East.

► **Cornell Aeronautical Laboratory**, Buffalo, N. Y., is building a 100,000-sq. ft. $1-million addition to its facility that will nearly double the size of its present plant.

► **Solar Aircraft Co.**, San Diego, Calif., has received more than $7 million in new orders since Jan. 1, including a contract exceeding $1.2 million from Douglas Aircraft Co. for additional turbine engine generator sets and parts for C-124 auxiliary and emergency power. General Electric has awarded the firm an order approximating $2.5 million for J47 turbine components.

► **Pacific Airmotive Corp.**, Burbank, Calif., has separated its manufacturing operations into two separate divisions. The newly created test and handling equipment division will be responsible

for production activities at Burbank in addition to setting up a manufacturing plant at the company's Linden, N. J., facility. PAC's pressurization and temperature control group will be known as the aero-pneumatics division.

► **Danly Machine Specialties, Inc.,** Chicago, Ill., has expanded facilities and is now operating two complete production lines for die set manufacture.

C-W Study Explains Titanium Machining

Titanium alloys are extensively analyzed in United States Air Force Machinability Report, Volume 3, 1954.

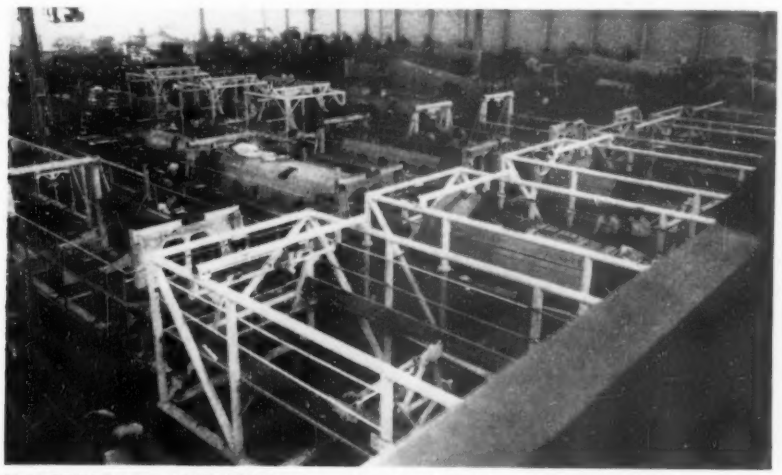
Just announced by Curtiss-Wright Corp., which directed and published the compilation under contract with USAF, the report is wrapped up under the general approach of increased production, reduced costs through a better understanding of the machining process, and control of materials, tools and machines.

Aimed at establishing a base of information for production machining of titanium alloys, this 153-page volume is prefaced with a refresher on metal cutting principles and details of titanium's machining behavior.

Shop procedures such as turning, milling, routing, drilling, tapping, abrasive cutting, hacksawing, belt and surface grinding, and high-temperature-alloy machining each get individual chapters. The last of these is a continuation of previous machinability studies. The book is illustrated profusely with graphs, charts, photos and micro-sections.

Test work on this titanium alloy project was organized and accomplished by Metcut Research Associates. The volume was written by James Van Voast.

Information on availability and price of the book may be obtained by writing Curtiss-Wright Corp., Wood-Ridge, N. J.



H-21 FUSELAGE ASSEMBLY is stepped up as Piasecki cuts back subcontracting.

Piasecki Builds Helicopters Faster

An efficiency program inaugurated early last year by Piasecki Helicopter Corp.'s Manufacturing Division has resulted in the Morton, Pa., firm increasing the number of shop-completed copters by 57.3% compared with the previous year and cutting man-hours per airframe pound by 47.7%. Completed airframe pounds climbed 100%.

The program included adding the H-21 Work Horse fuselage to the firm's production lines and bringing in a large number of other parts to increase "on-site" manufacturing and economize on subcontracting. During 1953 the amount of subcontracted work was cut 22%. In reducing subcontracting, management anticipates that cost dollars spent outside for material and work will fall to 25% of total contract costs. It was still 70% by the end of 1953.

On the H-21 fuselage, detailed lofting of tooling holes is carried on from the assembly fixtures to the finished fuselage, eliminating jigging to maintain metal contour and allowing use of simple fixtures.

Plastic tooling has also been introduced to make apply-templates, form blocks, machine shop drill jigs and milling fixtures. Glass-cloth tools and production parts are being developed.

The company last year put in a plaster shop for making master tools, master body patterns, checking fixtures and other items, and permitting the firm to build its own patterns and drop hammer dies.

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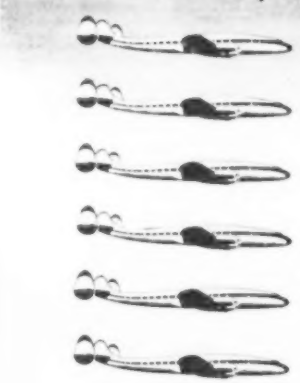

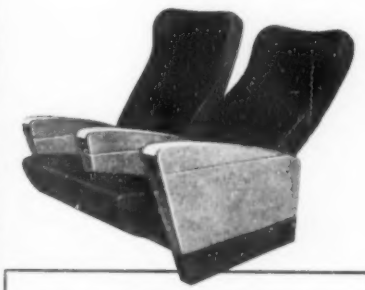

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BuAer Contracts

The following contract awards of $25,000 and more have been announced recently by the Bureau of Aeronautics, Department of the Navy, Washington 25, D. C.

BABCOCK RADIO ENGINEERING, INC., Van Nuys, Calif., evaluation models of XEL-266 radio receivers, handbooks, spare parts, 17, $35,190.

ECLIPSE-PIONEER DIV., Bendix Aviation Corp., Teterboro, N. J., special tools and ground handling equipment for pneumatic starters, $25,000.

CHICAGO AERIAL SURVEY CO., Chicago, Ill., (1) reproducible copy each of a handbook of overhaul instructions and an illustrated parts breakdown to cover the following: (a) interval controller; (b) dual servo power units; (c) master control; (d) photo control unit; (3) flare release panel; (f) multi-camera remote control system for type C-2 and multi-channel servo power unit, type D-2; (1) reproducible copy each of a handbook of operation and service instructions and an illustrated parts breakdown to cover: (a) a multi-camera interval control system; (b) a view-finder-photo aerial A16-VF; (c) a view-finder A8-VF; (d) reconnaissance camera control panel; (3) photo observers; (f) correlating counter; (g) overrun control, $60,260.

GENERAL ELECTRIC CORP., Elkton, Md., conduct a research and development program to obtain a lightweight-high-strength airship envelope fabric for the "K" type airship; (1) reprod. and (12) copies of a procurement specification covering fabric so developed; progress and final engineering reports; furnish a 100-yd. sample of the fabric developed, $109,594.

GENERAL ELECTRIC CO., Schenectady, N. Y., line maint. testers, 20, test cable sets, 20, carrying cases, 20, spare parts, dwgs., $77,078.

LETOURNEAU-WESTINGHOUSE CO., Peoria, Ill., crash salvage cranes with "A" prime movers, 25, $916,250.

LOCKHEED AIRCRAFT SERVICE, INC., Burbank, Calif., additional services and material for overhaul of (2) model WV-1 aircraft, $201,471.

PHILCO CORP., Philadelphia, Pa., design and field engineering services during installation and evaluation of radar sets and indicator groups, $40,125.

SPERRY GYROSCOPE CO. DIV., Sperry Corp., Great Neck, L. I., N. Y., conduct an engineering investigation and prepare and furnish (1) reproducible and (4) reproduction copies of a detailed specification for frequency meters; developmental models of frequency meters, dwgs., spare parts, publs., design data, reports, 5 ea., $31,000.

DE FRENES CO., Philadelphia, preparation of the master shooting scripts with complete storyboards and production of (3) 35-mm. black and white, sound, motion picture training films on the general subject of "Medical Aspects of High Intensity Noise" (U. S. Navy No. MN-9318a); (b) "Symptomatology and Prophylaxis of Acoustic Trauma" (U. S. Navy No. MN-9318b); (c) "Ear Defense," (U. S. Navy No. MN-9318c), $33,212.

DOUGLAS AIRCRAFT CO. INC., Santa Monica, Calif., kits of parts for radio backfitting changes in Model R6D-1 and R6D-1Z aircraft, $36,959.

ALLISON DIV., General Motors Corp., Indianapolis, services, materials and parts necessary to repair, modify, overhaul, investigate, inspect and run special tests on government-owned contractor's model XT40 and XT38 engines or parts thereof at contractor's plant, Indianapolis, as provided in order, delivered to the contractor from time to time by the government; not to exceed $50,000.

I-T-E CIRCUIT BREAKER CO., Special Products Divisions, Philadelphia, acquisition and installation in the contractor's plant at Philadelphia, of test equip. and other capital equip. required for conducting aerodynamic wave machine tests on a full-size jet engine component, $66,500.

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Fast Writeoffs

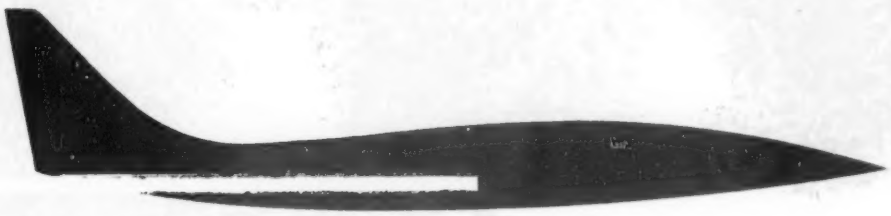
Accelerated tax amortization for manufacturers expanding their defense facilities is granted by the government in the form of certificates of necessity.

In the following list of recent certificates, company name is given, followed by product or service, cost of construction deemed necessary for defense expansion, and the percentage of the expansion cost allowed for faste write-off. Fast writeoff permits property to be depreciated in five years.

- **Fairchild Engine & Airplane Corp.**, Farmingdale, L. I., N. Y., aircraft, $6,737, 65%.
- **Solar Aircraft Co.**, Des Moines, Iowa, aircraft parts, $145,542, 65%.
- **Trimline Grinding Corp.**, Cleveland, Ohio, tooling and die maintenance for aircraft production, $10,481, 70%.
- **Lancaster Metal Products Co.**, Lancaster, Ohio, special industrial services for production of aircraft parts, $52,000, 65%.
- **Consolidated Vultee Aircraft Corp.**, San Diego, Calif., military aircraft, $908,070, 65%.
- **Sheridan Products, Inc.**, Inglewood, Calif., aircraft production tools, $1,367, 70%.
- **Eagle Tool & Machine Co., Inc.**, Springfield, Ohio, aircraft and ordnance parts, $25,804, 70%.
- **Anthony Cantarella, Sebastian Cantarella & Daniel Moto,** dba Atlantic Mastercraft Co., Bronx, N. Y., aircraft parts, $10,545, 70%.
- **Nemec Combustion Engineers**, Whittier, Calif., military aircraft components, $31,320, 55%.

RCA OPENS NEW HORIZONS

in AVIATION ELECTRONICS!



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And You Can Specialize In: Radar • Analog Computers • Digital Computers • Servo-Mechanisms • Shock & Vibration • Circuitry • Heat Transfer • Remote Controls • Sub-Miniaturization • Automatic Flight • Transistorization • Design for Automation

You Should Have: Four or more years' professional experience and your degree in electrical or mechanical engineering, or physics

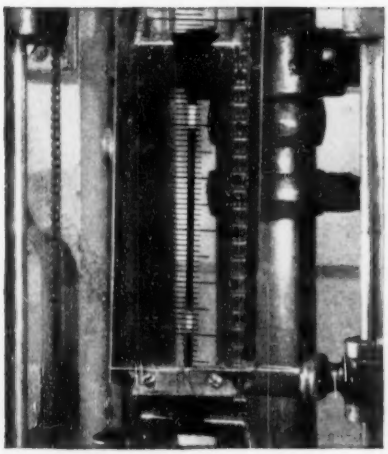
You'll find unlimited opportunities for professional advancement in RCA's broadened aviation electronics program! Suburban or country living nearby. Relocation assistance available.

And at RCA, you'll move ahead through *learning* as well as *doing* . . . for RCA encourages you to take engineering *graduate* study with company-paid tuition. You'll also enjoy professional status . . . recognition for accomplishment . . . unexcelled facilities . . . *many* company-paid benefits.

Your RCA career can start now! Begin by sending a resume of your education and experience to: **Mr. John R. Weld, Employment Manager**
Dept. B-450E, Radio Corporation of America
Camden 2, New Jersey

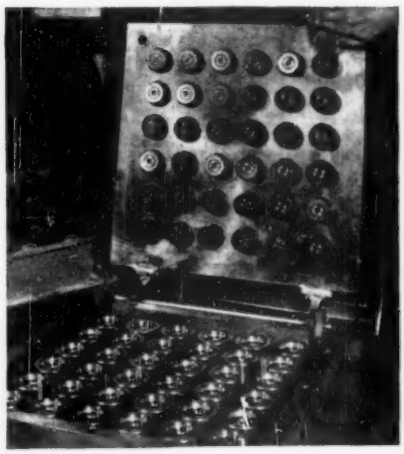
RADIO CORPORATION OF AMERICA

No wonder



2. Elongation, tensile strength and maximum compression set ratings are determined with care. Laboratory and service tests make sure these rated characteristics are held.

3. Fluid and temperature tests check compound resistance to oils, fuels and chemicals at high and low temperatures . . . assuring the long life of Parker O-rings.



4. Precision molding of superior compounds provides close tolerance fits. Parker has molds for *every* standard O-ring size. Mail the coupon for data.

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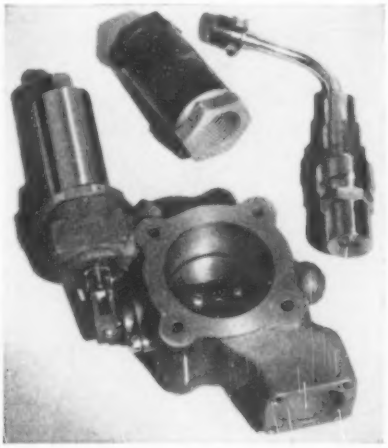
1. New nonflammable hydraulic fluids ruined one O-ring . . . didn't harm the other in this sealing test. Both were originally the same size. Yet, one is now swollen, chewed and chipped. The other wasn't damaged because it was molded of a Parker compound that resists nonflammable fluids.

Pressure and temperature can also cause problems. When you use Parker O-rings, you are sure to get exactly the *right* O-ring for your *specific* application. For instance, Parker's new compound 612-45 fully meets requirements of MIL-R-7362 covering synthetic-rubber seals for use in high-temperature lubricating oils.

Parker O-rings are approved for *all* military applications. We invite you to compare Parker O-rings with any other make. Here are some of the reasons why you'll find they seal better and last longer . . .

5. Compare actual samples. Ask your Parker representative to check your specifications. Prove how Parker O-rings seal better and last longer.



6. What other Parker products for aircraft applications interest you? We build jet-engine accessories (shown above) for engine *fuel, hot-air* and *hydraulic* systems.

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New GCA Gives Precision at Low Cost

• Light, portable radar gives both aircraft azimuth and elevation; new-type display has high accuracy.

By Philip Klass

Boston—A new precision approach radar, so light and portable that it can be airlifted by helicopter or C-47 to forward tactical airstrips and put into operation in a couple of hours, was unveiled here recently by Laboratory for Electronics, Inc.

The $35-50,000 estimated price tag on the new GCA could make it attractive for small and medium-size civil airports which cannot qualify for government-furnished instrument landing aids. Full-size PARs used by Civil Aeronautics Administration cost approximately $100,000, uninstalled.

The new equipment is called SPAR (super precision approach radar), with some justification for the adjective "super."

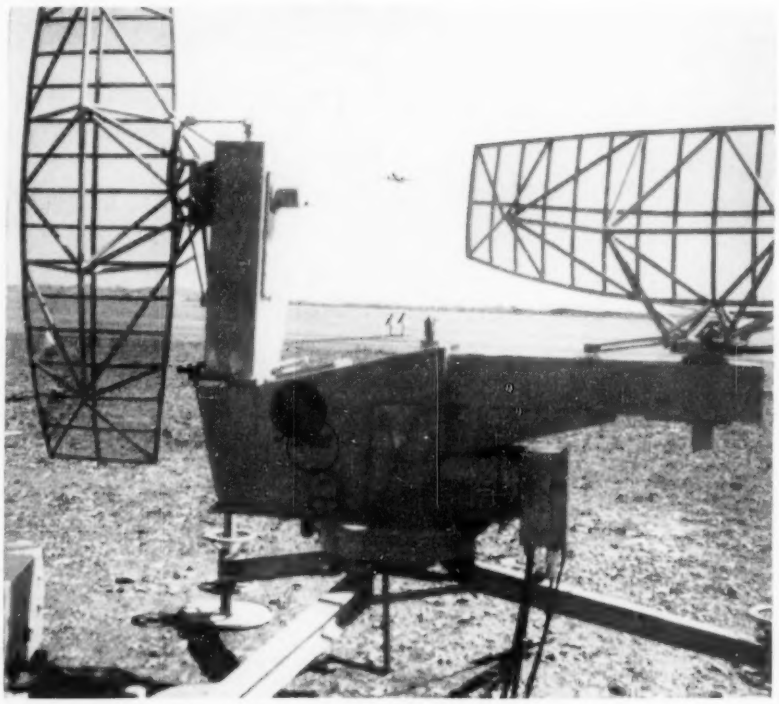
This radar set provides a novel type of visual display which shows airplane deviation from the desired flight path on a much-expanded scale as the plane nears touchdown.

SPAR is a true approach radar, displaying both airplane azimuth and elevation position. British low-cost airport radars developed by Decca Radar, Ltd., and A. C. Cossor Radar, Ltd. (AVIATION WEEK Jan. 11, p. 43) give only azimuth (PPI) displays.

► **Spar Demonstrations**—The new GCA, developed by Laboratory for Electronics with its own funds, has been shown to a variety of USAF, Navy, Army, and civil aviation groups. For example, the set underwent two-weeks' trial by the Military Air Transport Service at Andrews AFB, two-days' trial by the Marines at Quantico, and (at the time of writing) is scheduled to instrument a barren airstrip in South Carolina for an F-86 exercise by the Tactical Air Command.

During the recent demonstration in Boston, press representatives made two SPAR-directed approaches at Logan airport in an LFE-chartered Northeast Airlines Convair-Liner equipped with closed-circuit TV so cabin passengers could view the runway from the cockpit.

GCA (ground) operator voice instructions were heard over the plane's public address system. Both approaches brought the Convair-Liner into position over the runway, one of them within inches of the runway centerline, despite a strong crosswind.



SPAR SYSTEM guides Convair-Liner to within inches of runway centerline in test. Maximum error at touchdown is 20 ft., says manufacturer of new approach radar.

QUICK INSTALLATION is one feature of new approach system. SPAR's radar transmitter-receiver and power supply are housed in weatherproof metal boxes which can be laid on ground. Operator's console can be placed in truck, in tent or control tower.

► **Operational Features**—Here are some of the interesting operational features of the new SPAR equipment.

• **System accuracy:** LFE says maximum error is 20 feet at touchdown, 0.5% at all other ranges.

• **Coverage:** 30-deg. sector in azimuth

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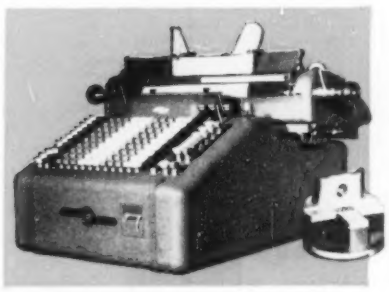

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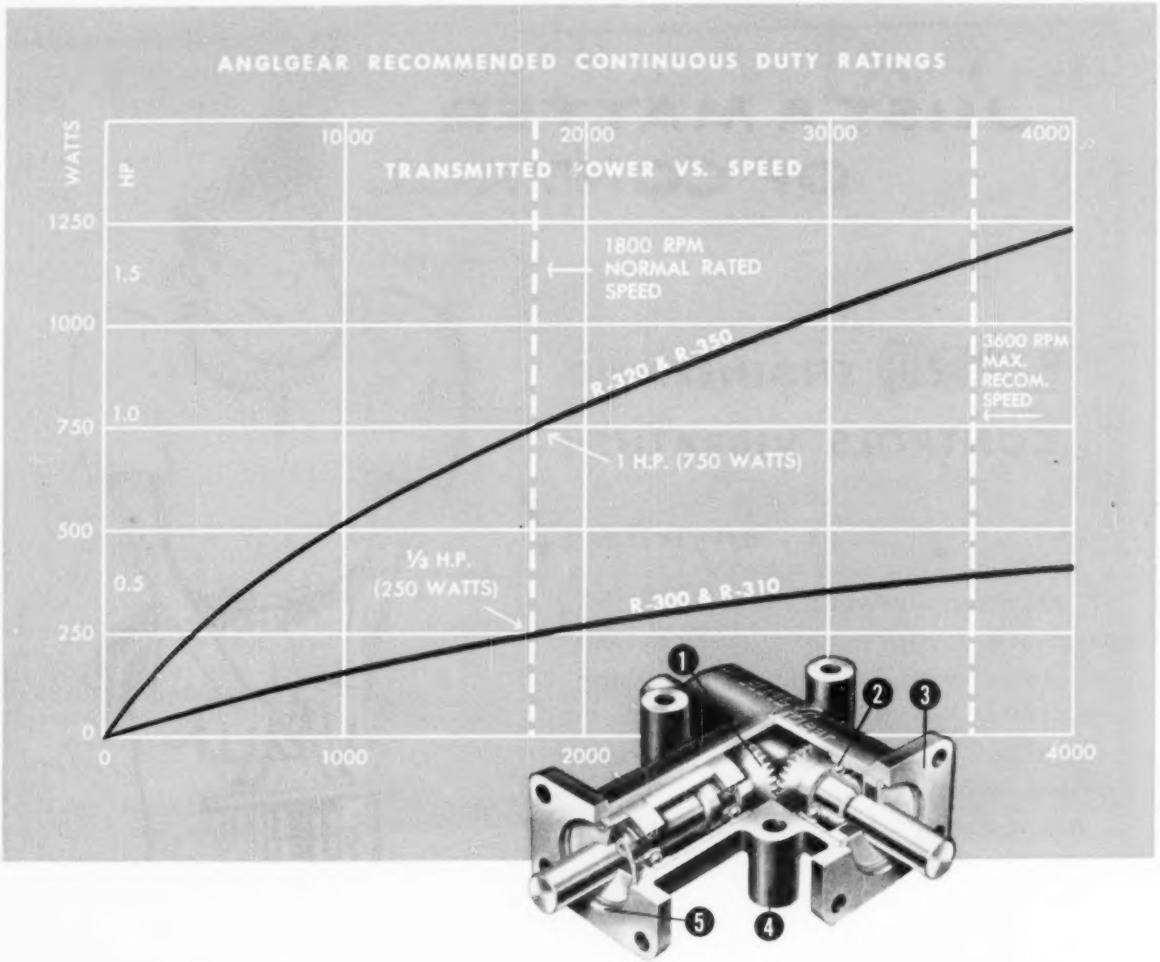

ORIGINAL RIGHT-ANGLE GEAR UPRATED

Now, six years after introduction, ANGLgear stands significantly improved. Static torque rating has been boosted 60%, broadening the field of application. And a fresh set of teeth—the new Coniflex design—has been added to insure smooth, quiet operation, and even longer life. These, however, are the only changes in ANGLgear. The units remain small in size and low in price.

1. Coniflex gears
2. Antifriction bearings
3. Flanged end mountings
4. 3-bolt side mounting
5. Internal pilot on mounting ends
6. 1-1 ratio

Model	Type	H.P.	R.P.M.	Ultimate Static Torque (In lb.)	Shaft Dia. Inches	Wt.
R-300	2 WAY	⅓	1800	400	⅜	½ lb.
R-300x	2 WAY	—	—	500	⅜	½ lb.
R-310	3 WAY	⅓	1800	400	⅜	½ lb.
R-310x	3 WAY	—	—	500	⅜	½ lb.
R-320	2 WAY	1	1800	1500	⅝	2¼ lb.
R-330	3 WAY	1	1800	1500	⅝	2⅜ lb.

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and 10 deg.. in elevation, compared to 20 deg. and 7 deg. for conventional PAR. Added SPAR coverage permits viewing aircraft on downwind leg of approach.

• **Minimum range:** 10 miles for an F-80, more for larger aircraft.

• **Off-runway location:** Antenna pedestal can be located up to 800 feet away from runway centerline, displaced up to 10,000 feet along runway from point of touchdown. Display console can be remotely located up to 10,000 feet away.

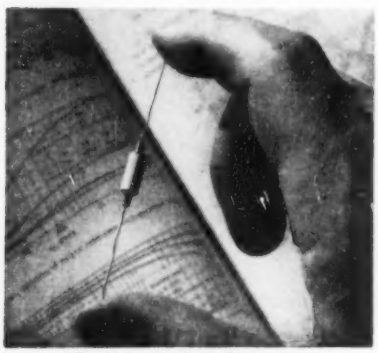
• **Multiple runway service:** Antennas can be repositioned in azimuth (manually) to permit SPAR to serve other runways, without relocating antenna pedestal. LFE says reorientation requires less than 30 minutes.

• **Quick set-up:** Company says it takes less than eight man-hours to install, align, and put SPAR into operation (if antenna pedestal is already assembled).

The antenna pedestal, largest of the SPAR components, can be disassembled and packaged in a crate of about 5x6x1½ ft. for air transport. However, the assembled unit could probably be transported for short distances by helicopter using a cargo sling.

▶ **For Tactical Use**—Construction of the prototype equipment which LFE demonstrated reflects the rugged military environment in which it would have to operate as a tactical air aid. The radar transmitter-receiver and the power supply are housed in strong weatherproof metal "caskets" which can be laid on the ground in an convenient location. The antenna pedestal construction appears to be extremely rugged.

The operator's console, housing a 15-in. cathode ray tube, video amplifier, sweep, range mark, and associated circuits, can be placed in any small en-



Sealed-In Diode

Hermetically sealed-in-ceramic germanium diodes are now available from General Electric in three JAN types (1N69, 1N70 and 1N8I) and some commercial computer types. Others will be available in a few months. Metal-to-ceramic end seal enables new diodes to exceed JAN humidity requirements, GE says.

Are you one of a select group of aerodynamicists sincerely interested in boundary layer control projects? The Aircraft Division of Fairchild offers a genuine creative opportunity to such men.

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☆ **BOUNDARY LAYER CONTROL**

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FAIRCHILD
Aircraft Division
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closure, including a tent. At Logan, it was housed in the rear of a truck.

At a civil airport, the console would be located in the control tower.

▶**Unusual Scope Display**—SPAR, like conventional PAR, has a separate azimuth and elevation display on a single scope. Unlike the conventional polar-coordinate (pie-shaped) display, LFE uses rectangular coordinates (B-scope) to show airplane azimuth and elevation as a function of range. Thus, the desired glide slope and localizer paths look much different from those shown on a conventional PAR scope.

Instead of V-shaped localizer and sloping glide path, the SPAR flight paths are nearly horizontal lines until near the point of touchdown where they curve away quite sharply.

This B-scope presentation gives a higher ratio of radar-blip movement to airplane-deviation from the desired flight path as the plane approaches touchdown, effectively increasing "system gain." A Rome Air Development Center spokesman told AVIATION WEEK he was very favorably impressed with the new type of display and that RADC might employ it in new radars. He added that RADC might purchase one or two of the new SPARs for evaluation.

Desired localizer and glide slope flight paths appearing on the scope are electronically computed and can be adjusted for a variety of approach angles and distances, LFE says. Corner reflectors, whose positions along the runway are known, provide a constant check on the accuracy of the electronically computed flight paths.

▶**Technical Highlights**—Here are some of the technical highlights of the new GCA:

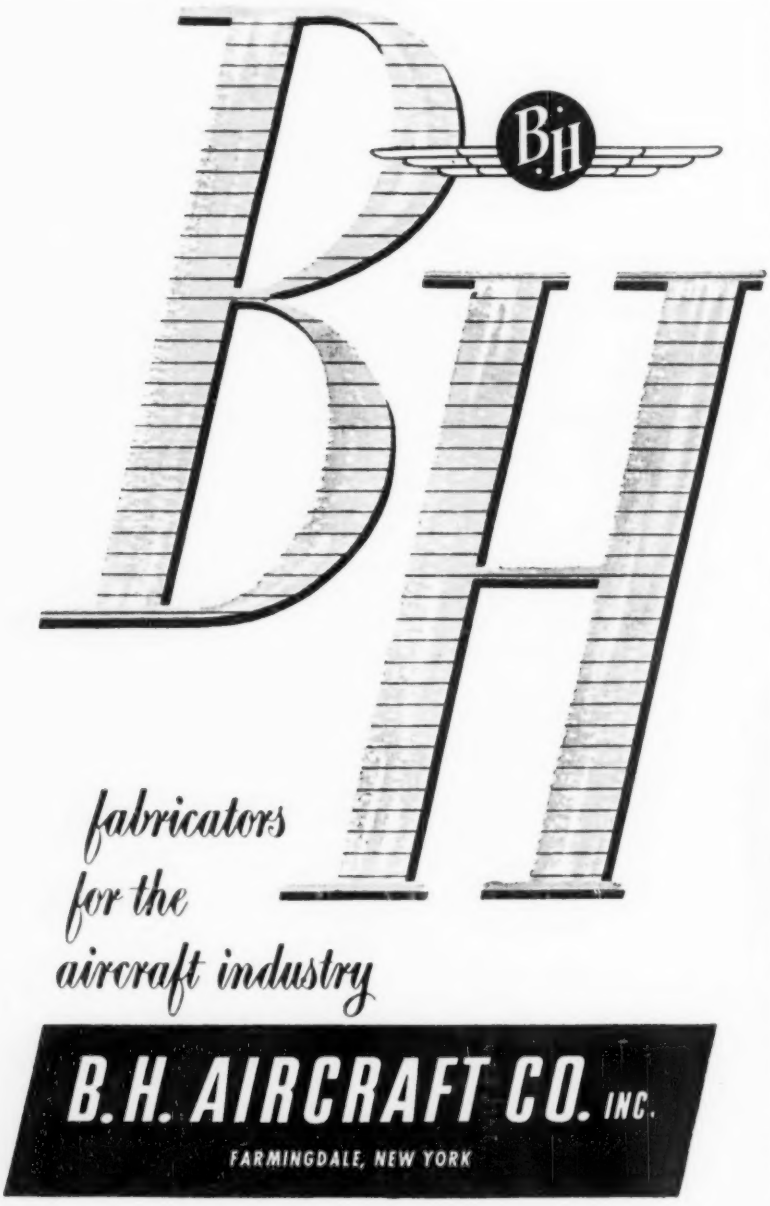
- **Frequency:** 9,080 mc. (X-band).
- **Peak power:** 50 kw.
- **Beamwidth:** 0.8 deg. (narrow dimension) for both azimuth and elevation antennas.
- **Pulse width:** 0.5 microseconds.
- **Repetition rate:** 2,000 cps.
- **Scan Rate:** 2 cps., for both azimuth and elevation antennas.

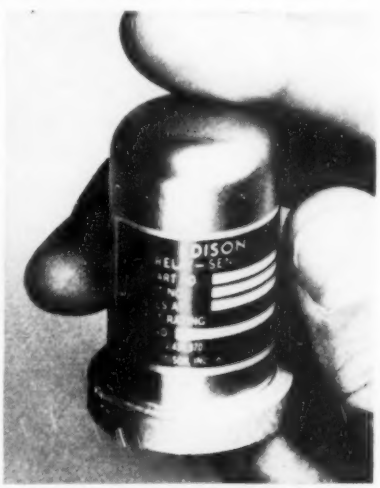
▶**Keep It Simple**—To keep cost, weight and complexity down, LFE has not included such radar refinements as MTI (moving target indication).

Lacking MTI, and with its antenna mounted only a few feet above ground, there was considerable clutter on the scope from fixed ground targets during the demonstration here. LFE believes that this clutter will not prove objectionable to an experienced GCA operator. Although the basic SPAR does not incorporate circular polarization, to reduce rainfall clutter, the company says it can be provided if desired.

The basic system uses 75 electron tubes, weighs under 2,000 lb., including antenna pedestal.

▶**About LFE**—Laboratory for Elec-





Microwatt Relay

Tiny sensitive relay, requiring input power as low as one microwatt, can be operated directly from thermocouples and photocells, according to Thomas A. Edison, Inc.'s Instrument Division, West Orange, N. J. The new Model 219 relay comes in SPST or SPDT styles with contacts rated at 350 ma. Unit has 1.1 in. dia. and is approximately 2 in. long, weighs 0.15 lb.

SPECIAL INSTRUCTIONS: Both Coasts – Burbank or Linden

DATE: 5/4/54

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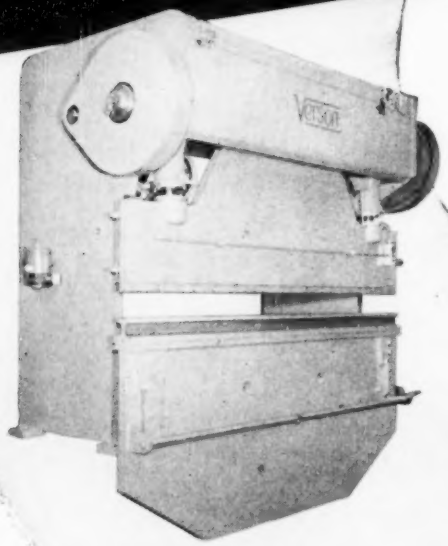
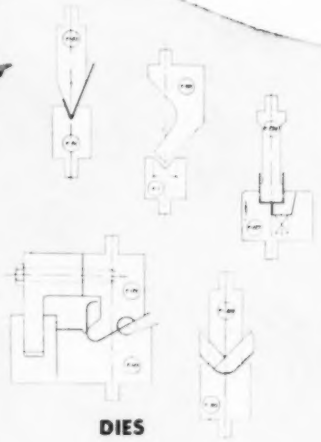


PRESS BRAKES



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TECHNICAL AIDS

Whatever your requirements in press brakes and press brake dies, it will pay you to have full information on Verson's complete service available at all times. Check this list and write for the data you can use:

PRESS BRAKES—The Verson line includes both mechanical and hydraulic models ranging from the 16-48 which will bend 48" of 16 ga. mild steel up to the largest ever built. Included in the line are two standard models available from stock. Catalog B-51 which gives full specifications is available on request.

PRESS BRAKE DIES—The Verson line ranges from the simplest Vee bend dies to the most intricate progressive dies and punching attachments. Over 200 of the most common die sets are illustrated in the Verson Die Manual which is available on request.

TECHNICAL AIDS—Verson technical aids include the 112 page Die Manual which in addition to illustrating typical dies gives much selection and application data available nowhere else. Augmenting the manual is a handy pocket size tonnage calculator which quickly tells the tonnage required for making any bend. Copies of both of these aids can be had by request on your company letterhead.

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tronics, formed in 1946 and located in Boston, devotes much of its efforts to development in the avionics field, both airborne and ground-based. Sims McGrath, company president, told AVIATION WEEK that, measured in dollar volume, his company is one of Rome Air Development Center's largest contractors. LFE gets approximately 5% of RADC's development expenditures, he says.

LFE has approximately 550 employes, of whom 125 are graduate engineers or scientists, according to Donald F. Cutler, Jr., executive vice president.

Makers Announce New Avionic Units

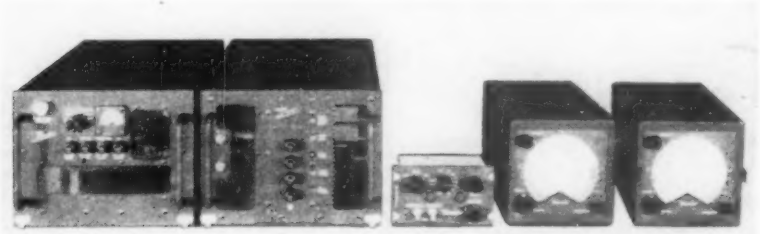
Several recently announced devices have been developed to meet avionic requirements of smaller size, lower weight and greater reliability. They include:

• **High-G relays,** reportedly capable of withstanding 20G vibration at 500 cps., and operating at 325F, are available in 2-, 3-, or 4-pole, double- or single-throw, or 6-pole single-throw configurations. Contact ratings of 3, 5, or 10 amp. are standard and operating coils are available for a wide range of d.c. voltages. Relay is made by Hetherington, Inc., Sharon Hill, Pa.

• **Precision film resistor,** said to be the first to meet MIL-R-10509A, proposed Modification 2, is available in ¼-, 1-, and 2-watt ratings at ambient temperatures of 70C. Identified as Types 4E, 5E, and 6E, new resistors are encapsulated to protect resistance element and keep out moisture. For more information, write for Bulletin 130 to Sprague Electric Co., 327 Marshall St., North Adams, Mass.

• **Rotary speed control,** called the KC-223 translator, will open or close a set of electrical contacts at any predetermined rpm., with an accuracy of 2%. Device was originally developed to detect overspeeding of helicopter rotors and aircraft engines. Manufacturer is Kahn & Co., Inc., 541 Windsor St., Hartford 1, Conn.

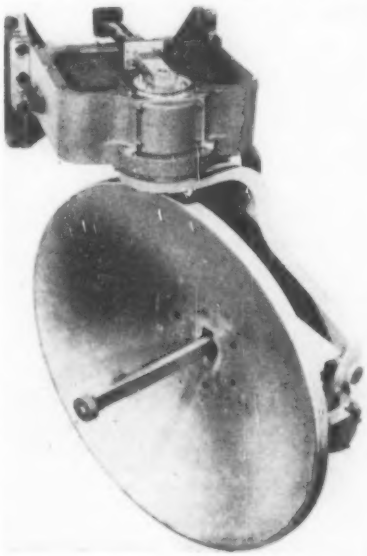
• **Low-leakage capacitors,** with a self-time constant reportedly in excess of 4,800 hours, is designed for use where low power factor and high insulation resistance are required. Device may be operated at temperatures of −80 to



Transmitter-Receiver | Synchroniser-Amplifier-Power Supply | Control Unit | Indicators

Bendix Shows Airborne Storm-Warning Radar

First photos of new Bendix Radio airborne storm-warning radar (engineering prototype) show packaging designed for mounting in airline radio rack and console, simple operating control unit, and dual indicators for pilot and co-pilot. New RDR-1 radar operates at X-band (3.2 cm.), weighs 135 lb., and reportedly is designed to specs prepared by Aeronautical Radio, Inc., except for the operating wavelength. (Arinc spec calls for 5.7-cm. operation.) Antenna is designed for mounting in the nose. It has a 22-in. diameter dish and line-of-sight type stabilization of both roll and pitch axes. The prototype radar is now undergoing lab tests. It is slated to be flight tested this summer, first on a Bendix airplane and later by Pan American World Airways. Bendix reports several radar orders from corporate plane owners. Panagra recently authorized RDR-1 installation provisions for its fleet of DC-7s (Aviation Week Apr. 26, p. 7). Airline is now testing an AN/APS-42 radar in a DC-6B.



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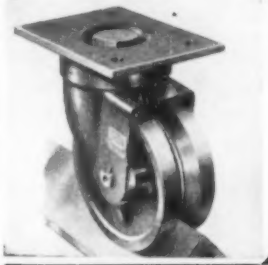

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Information about other Darnell Casters used in the aviation industry will be found in this 192 page manual describing over 4000 types of casters and wheels. Send for your copy. It should be in your files.

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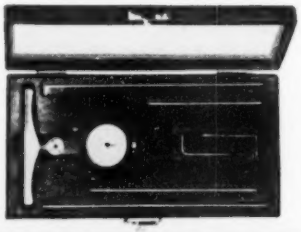

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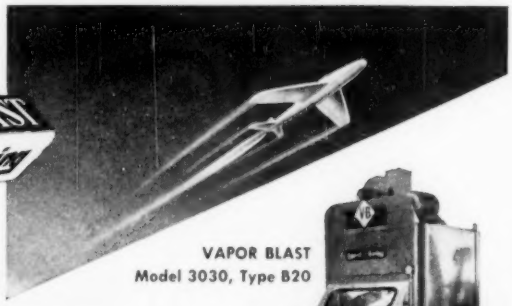

VAPOR BLAST
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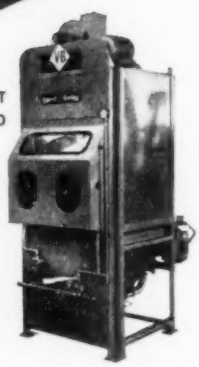

One of five standard Self-Contained models. Custom machines also built to order for special needs.

Aircraft Plant Saves $13,415.65 in ONE MONTH'S Operation

Adding the Vapor Blast method of metal finishing saved one leading aircraft parts manufacturer a total of $13,415.65 in a single month! This saving was achieved on only FOUR operations—deburring such parts as housings, rocker box covers, valve tappet guides, and gears! Percentages of savings ranged from 200% to 1190% over hand deburring!

According to the manufacturer's own survey, this meant that some Vapor Blast Equipment was more than paid for in a few weeks and all was paid for in a few months.

Amazing as they are, these figures are typical of the benefits that you, too, may expect with Vapor Blast Liquid Honing on a wide variety of finishing operations — on metal parts, dies, molds, gears, tools, wherever you need surface cleaning and fine finishes economically.

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Catalog 1117A, to Industrial Condenser Corp., Dept. A-34, 3243 N. Calif. Ave., Chicago 18, Ill.

FILTER CENTER

▶ **L-5 Autopilot for Connies**—The Lear L-5 autopilot and approach coupler have been approved for installation in Super Constellations, following CAA tests in a Navy R7V-1.

▶ **M-H Shows New Engine Control**—New automatic integrated electro-hydraulic control system developed by Minneapolis-Honeywell for afterburner-equipped turbojets, is slated for use on the Allison J71. New system, which weighs 100 lb. and uses magnetic amplifiers, was displayed for the first time at the recent IRE convention in New York.

▶ **Ramo-Wooldridge Expands**—New Ramo-Wooldridge Corp., formed by two former Hughes Aircraft vice presidents, has reportedly revised initial plans to limit activities primarily to research and development and now contemplates sizable manufacturing operations.

▶ **M-H Power Transistors In Production**—New Minneapolis-Honeywell 2N57 power transistor, rated at 20 watts collector dissipation at 70F, is now in pilot production (30-40 a day). Company hopes to increase production rate of 500 a day by September, to several thousand a day by 1955.

▶ **Long-Range Nav-Aid Report**—A report outlining operational objectives for a system of long-distance radio navigation aids, representing the collective opinion of more than 40 experts in the field, has been prepared by Special Committee 67 of the Radio Technical Commission for Aeronautics. Copies of the report (Paper 37-54/DO-55) may be obtained for 15 cents from the RTCA Secretariat, 1724 "F" St. N.W., Washington 25, D. C.

▶ **Avionics Literature** – Recently announced publications of interest to persons in the avionics field include the following:

- **Transducer,** a differential pressure sensor with potentiometer pick-off, Model 508, available in standard pressure ranges up to 30 psi, is described in data sheet No. 508 available from Bourns Laboratories, Dept. NL, 6135 Magnolia Ave., Riverside, Calif.
- **Cathode follower probe,** Model F-400, for coupling high-impedance transducer pick-offs to low-impedance measuring equipment, is discussed in bulletin F-400. Write to Gulton Mfg. Corp., Metuchen, N. J.
- **Miniature precision pot,** Type RVP7/8, ⅞ in. dia., for servo or computer use, is described in bulletin available from Technology Instrument Corp., 531 Main St., Acton, Mass.

—PK

No rivets! No welds!

New solvent-free EPON® adhesive allows immediate assembly of metal-to-metal bonded parts

Epon Adhesive VIII, which meets or exceeds the requirements of Specification MIL-A-8331 (USAF), provides dependable aluminum bonding with contact pressure alone—just enough to make a uniform glue line. Adhesive VIII contains no solvents; parts may be assembled as soon as the adhesive is applied.

Only moderate temperatures are needed for maximum bond strength. Aluminum, for example, bonds readily at 200° F—well below the customary critical bonding temperature for this metal.

Epon Adhesive VIII's excellent flow and low surface tension result in superior fillet forming properties, substantially increasing the effective bond area in honeycomb applications.

Epon Adhesive VIII is equally efficient in bonding rubber, plastics, glass and wood.

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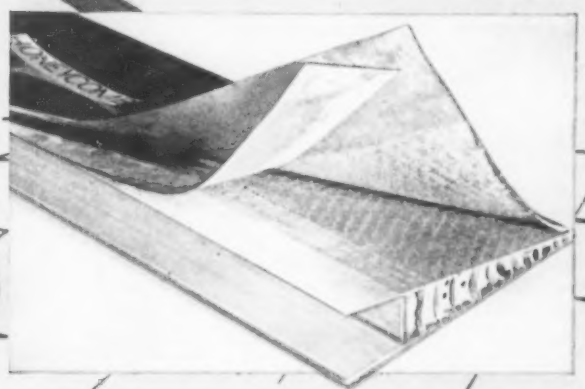
Epon adhesives are solving many aircraft bonding problems. Can they solve yours? Write for further information and samples.



Section through a trailing edge, showing honeycomb sandwich wing construction. Laminations such as these may be assembled immediately after application of solvent-free Epon resin adhesives.

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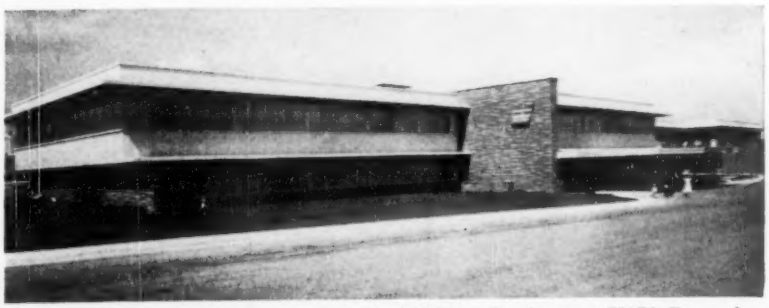
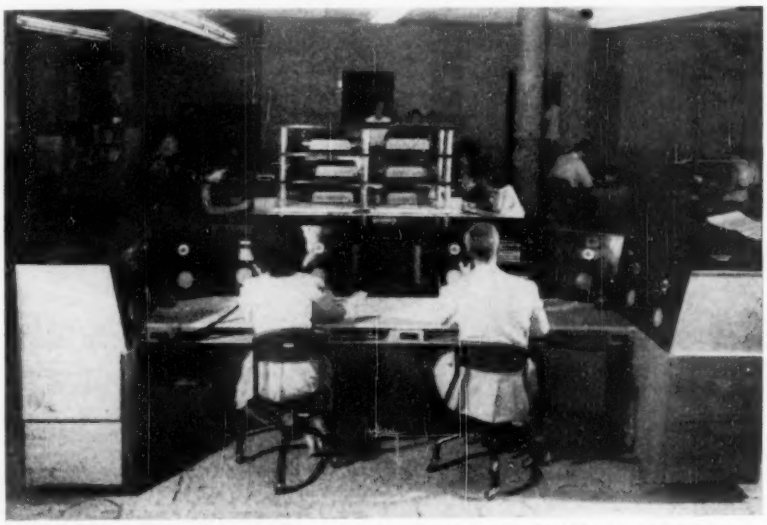
How UAL's Denver Nerve Center Works

● Airline's 9,000-man command post helps direct 4 million passengers and 82,000 flights a year

By George L. Christian



CENTRALIZED CONTROL operations take 90,000 sq. ft. of space at UAL's Denver base.



COMMUNICATIONS CONSOLE control is terminus for 13,000 mi. of phone lines.

Stapleton Field, Denver—United Air Lines flies more than 80 million miles annually, operating more than 82,000 flights. A Mainliner takes off or lands every minute of the day. Last year UAL carried almost 4 million passengers. Revenue passenger-miles were about 2.7 billion; airfreight ton-miles, 28.5 million; airmail ton-miles, 21 million; air express ton-miles, 11.4 million.

United's telephone bill last year was $1.8 million. Added to a Western Union bill of more than $1 million, the company's communications costs were close to $3 million for the year.

Nerve center of this large and expensive operation is located here at Stapleton Field. In a new structure, forming the northwest wing of the airport's terminal building, 9,000 UAL employes watch over the airline's 13,250-mi. system, stretching from the Atlantic Coast to Hawaii, and from Canada along the Pacific Coast almost to Mexico.

► **Two VPs**—Headquartered at the Denver base are Transportation Services, under vice president D. F. Magarrell, with 6,600 employes, and Flight Operations, under vice president D. R. Petty, with 2,500 employes. Flight Operations' roster includes the airline's 1,300 pilots and 300 flight engineers.

Transportation Services is made up of three divisions—Passenger Service, Ground Services, Cargo Service—each of which is further subdivided into departments.

The divisions making up Flight Operations are Flight Dispatch, Weather Service, Crew Planning, Equipment Utilization, Flight Training, Communications. The Flight Training Center at Denver has the first Curtiss-Wright Dehmel flight simulator to be put into service by a U.S. domestic airline.

United's fleet consists of six Boeing Stratocruisers, 21 DC-6Bs, 43 DC-6s, 43 Convair 340s, 35 DC-3s and 23 DC-4s of which 11 are cargo planes. UAL will soon take delivery on 12 more Convair 340s, and the first of 25 DC-7s was recently delivered.

► **Briefing Room**—The operating base has its "room with the 13,250-mile view." The civilian counterpart of military briefing room, the glass-front chamber seats about 25. An 8x20 ft. map at the back of the room defines all of United's routes. Five clocks show the times in the zones served by the carrier.

Panels on either side of the map show up-to-the-minute statistics on the condition of the airline, including fleet assignment, maintenance base status, equipment status, cancellations, load factors, delays of over 30 minutes (by cause and by station) and flight performance.

The big, glass wall in front allows any of United's executives to glance at the panels and map without entering the room or disturbing a conference.

Every morning at 8:30 United's operations executives gather to hear four briefing specialists give 15-minute outlines of what transpired along the airline's system during the past 24 hours and also a forecast of what can be expected for the next 24-hour period. The subjects covered include weather, maintenance, traffic, and equipment availability.

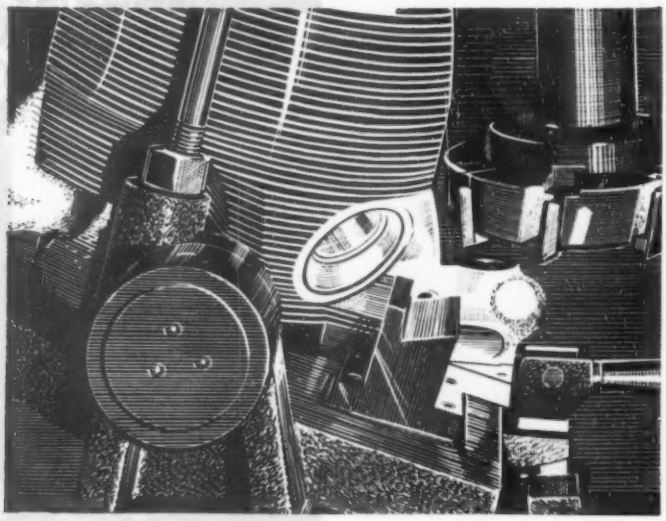
► **Ground Service**—For the next five years, United has earmarked $18 million for the erection of new buildings or the modification of existing structures. The airline's engineers work with local agencies on this type of construction. In small localities, where budgets are limited, United supplies architectural and engineering know-how to help the small community plan its air facilities.

Among the more ambitious projects now underway is a $5-million expansion program at New York International Airport, including a new hangar and UAL's 13th flight kitchen.

► **"Airdock"**—UAL is building a full-scale mockup of an "Airdock" at its Denver operating base. It is worked out on principles reminiscent of the

OK carbide cutter

facemills push-rod faces of cylinder head for world's most powerful piston aircraft engine



OK CARBIDE CUTTER, ON CINCINNATI VERTICAL FINISH-MILLS RIGHT ANGLES OF INTAKE AND EXHAUST PUSH ROD FACES, OF PRATT & WHITNEY AIRCRAFT WASP MAJOR ENGINE CLIMB-MILLING ONE AND CONVENTIONAL-MILLING THE OTHER

THE close tolerances specified by the aircraft industry are a challenge to the "world's most modern milling cutters" and the "world's most modern milling machines."

The picture shows one of thousands of milling machine operations. Note the tilting fixture which makes possible face and periphery milling, of both sides of the cylinder head.

OK carbide milling cutters are widely used in the aircraft industry because they have the necessary stamina . . . *more beef* in the body, pack *more blades* for finishing cuts, *heavier blades* for *roughing* cuts. They put more finished pieces on the floor, day after day.

Blades are simple wedge-shaped blocks. (The wedge is world's strongest mechanical device). Blades once set, cannot move. Mated serrations prevent tipping and slipping, provide a scale for blade advancement to compensate for wear, reduce grinding to less than .005" per blade on cutters in which the fine adjustment feature is incorporated. No locks, blocks, screws, pins or gibs are needed.

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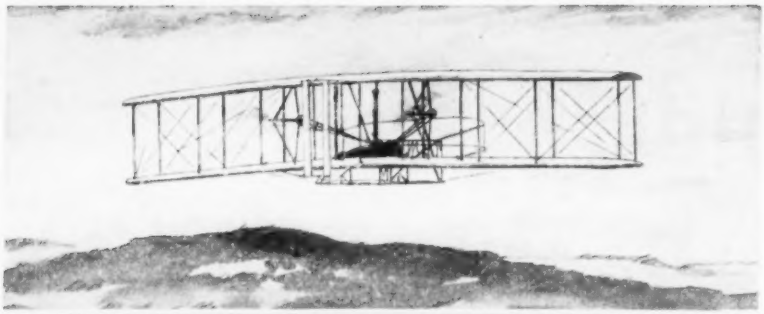
THE OK TOOL COMPANY INC., Milford, New Hampshire



$$F = C\frac{\rho}{2} SV^2$$

IN 1903, when the Wright Brothers were constructing the first successful powered airplane, there was data available on the forces on flat plates held at various angles in the wind. The problem of maintaining equilibrium presented the greatest difficulty of solution. The Wright Brothers had to depend on ingenuity, perserverance, courage and a home-made wind tunnel for solutions to their problems.

TODAY, IN 1954, aircraft development and production depend on the scientific skill of highly trained Engineers. During the past 50 years these Engineers have evolved countless formulae, such as the *Force-In-Pounds* equation above, to help provide simple solutions to aeronautical problems which once seemed insurmountable.

IN THE YEARS AHEAD, sub-sonic, trans-sonic and super-sonic problems will give way to hyper-sonic inquiries as new and greater opportunities challenge Aeronautical Engineers. If progress is to be made, new ideas are needed. New formulae must conquer problems of stress, space, loads and high speeds.

TO MEET THIS CHALLENGE, CONVAIR needs more Engineers with ingenuity. To get the job done will require "Engineering to the Nth Power." CONVAIR has the experience, record of past performance, leadership, determination and facilities to do the job.

OPPORTUNITIES ARE UNLIMITED at CONVAIR for high caliber creative Engineers. If you have confidence in your ability to help create tomorrow's aircraft, inquire now about these excellent opportunities . . . permanent positions . . . ideal working conditions and living environment in FORT WORTH, TEXAS.

CONVAIR

Send Resume to M. L. Taylor
Engineering Personnel Dept. 6-BB
CONSOLIDATED VULTEE
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FORT WORTH, TEXAS

Loadair device made by the Whiting Corp.

United's Airdock will include:

• **Fueling platforms** that rise from ramp level between the inboard and outboard nacelles of a four-engine aircraft, so mechanics can fuel and oil a plane (fuel from overwing booms) quickly and without the need of gas or oil trucks.

• **Cargo chutes,** which can be directed to cargo holds in the belly of an aircraft, convey freight and baggage to or from the Airdock's ground floor work center.

• **Passenger ramp,** which can be extended to the plane's loading door, allowing passengers to emplane or deplane without getting wet.

UAL's S. V. Hall, assistant vice president-facilities, said that with the dock, automotive and other ramp equipment can virtually be eliminated. Simultaneous handling of jobs such as baggage loading, fueling, passenger emplaning, will speed up ramp operations and cut ramp delays. Arriving flights will be able to discharge passengers rapidly. Baggage claiming (a long-standing source of irritation to passengers) will be expedited. Aircraft utilization will be increased. Airline personnel working the flight will perform most of their duties under cover.

Physically, the Airdock will be a two-story "finger" structure to which the plane is pulled mechanically. The Airdock includes air conditioning and water outlets, septic facilities and a conveyor belt running parallel to the parked plane and leading to the work center. An operator, using a bottom-controlled round table, can quickly sort baggage, mail and cargo.

Second floor will contain lobby, rest rooms and storage space for cabin supplies. An adjustable, covered bridge, allows passengers to go to or from the

UAL AIRDOCK model: 1. Baggage chutes, 2. telescopic fuel and oil platforms.

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Aircraft Controls

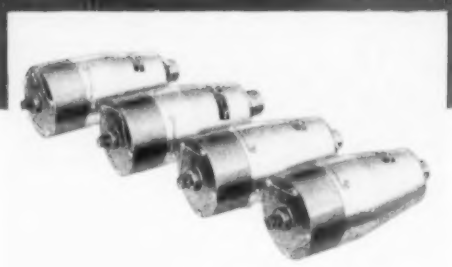
. . . selected to maintain correct cabin temperature on new Super Constellation

Aboard the new Super Constellation passengers travel in luxurious comfort. Contributing greatly to this are roomy new seating arrangements . . . handsome cabin appointments . . . and, most important, a highly efficient system that assures comfortable cabin temperature at all times.

To provide constantly correct operation of the system, Barber-Colman cabin temperature controls have again been chosen, just as they have many times before for various other types of Lockheed aircraft.

Other Barber-Colman products on the Super Constellation include flight deck temperature controls . . . gasoline heater cycling controls . . . auxiliary ventilation controls . . . windshield NESA controls . . . other relays and actuators.

For expert engineering assistance in selecting the components of your control applications, send design requirements to Barber-Colman Company.



Recent additions to the 22 Barber-Colman components supplied directly to Lockheed for the Super Constellation are four rotary actuators to position the primary aftercooler inlet and outlet doors.

The complete line of Barber-Colman aircraft controls includes: Valves; Positioning Controls; Actuators; Temperature Controls; Small Motors; Ultra-Sensitive Relays; Thermo-Sensitive Elements. Write for catalog F-4141. Engineering sales offices in Los Angeles, Seattle, Baltimore, New York, Montreal.

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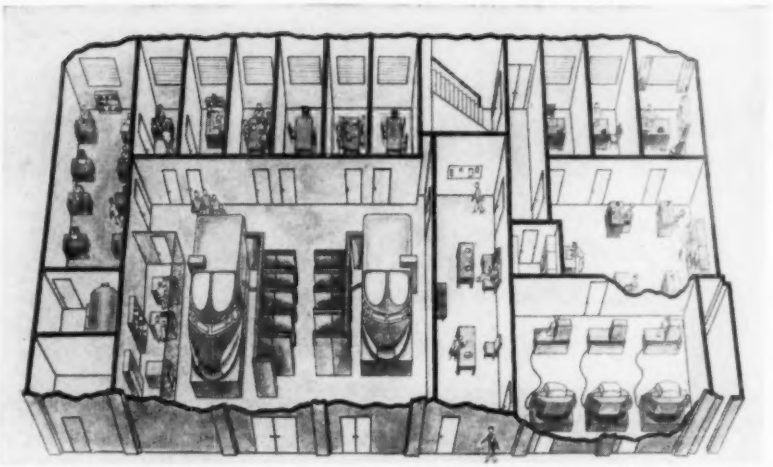


UAL TRAINING CENTER houses two C-W simulators plus three Links (lower right).

plane without getting wet.

▶**UAL & TV**—United is studying the use of television as a means of internal communications. Current experiments are limited to dissemination of flight information, space availability, etc., each different type of intelligence being transmitted on a different television channel.

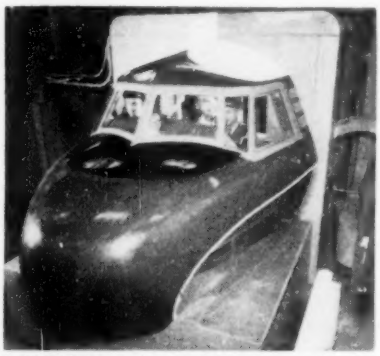
UAL officials hope to have such a setup in partial operation by early next year. They are optimistic about the possibility of video transmission over long distances, transmitting on low frequency carriers such as telephone and teletype transmission lines. They want to increase the projection size from standard 21-in. TV screens to the size of home movie screens.

▶**Space Control**—Heart of United's space control for 80 cities is in Denver. Agents sell space on any flight until Payload Control in Denver flashes a "Stop Sale" notice on the flight. This allows for rapid passenger space confirmation.

The vast communications network required for such a system is indicated by these statistics: Sales offices in the 35 major traffic-generating cities on UAL's system report reservations via a 13,000-mile private line telephone hookup. Sales offices in the remaining 45 cities use 26,000 miles of private teletype circuits.

Up to 10,000 telephone messages are recorded at Payload Control each day, sometimes at the rate of 2,000 an hour. At maximum capacity, the telephone recording system can handle 480 messages per minute. In addition, as many as 6,000 teletype messages are received in a heavy day, making a total of 16,000 messages received per 24 hours during peak periods.

The telephone connections are so arranged that all terminal stations on United's system can communicate directly with each other. And if desirable, all terminal stations can be linked together for a telephone conference.



CONVAIR 340 simulators are releasing training transports for operation on routes.

Airfreight is also controlled by Payload Control, where cargo expediters at Denver establish space-weight allocations for each UAL flight in and out of major terminals.

▶**Flight Training**—United's Flight Training Center here provides three types of training: indoctrination for new first officers, up-grading to captain's status, and transitional training when pilots move from one type of plane to another.

Current pilot training requirements are a one week's course during the year, plus a second 2-3 day period in the same year.

In 1945, pilot training cost the airline about $1,000 a year per pilot. Last year the cost had soared over the $2,000 figure. With its simulator program, UAL hopes to turn the cost curve downward again.

Use of the simulators will probably allow the airline to release two of the four aircraft now assigned to pilot training.

Here are some comparative figures United worked out for hourly training costs of a DC-6 vs. a DC-6 simulator:

DC-6 AIRCRAFT	
• Fuel & oil	$82.55
• Insurance	1.95
• Maintenance	40.60
• Amortization	52.00
• Ramp service	12.60
• Instructor's salary	20.00
Hourly total	**$209.70**
DC-6 Simulator	
• Power	$0.75
• Maintenance	2.00
• Modification & overhaul	3.00
• Housing, heat, light	1.25
• Amortization	42.00
• Instructor & operator	15.00
Hourly total	**$64.00**

United already has two Convair 340 simulators in operation—one in Denver the other in Chicago. By June, it hopes to have two DC-6B simulators working too, one in each city.

Total cost of the simulators is approximately $3.2 million, with the DC-6B units costing about $100,000 more each than the Convair units.

▶**Passenger Service**—An airline spokesman ran off these statistics about passenger handling: It takes 47 different operations to check a passenger in. . . . 6% of all passengers have excess baggage. . . . It takes 3:32 min. to give a passenger complete service, 1:01 min. to ticket him.

He added that United is doing a lot to accelerate passenger and baggage handling. A new set of Service Principles has been evolved and has been almost activated at Los Angeles. Among them are separation of baggage from ticketing; baggage checking and check-in by flight; advance preparation of baggage tags and tickets.

▶**Automatic Answering Machine**—United plans to use an automatic answering machine, developed by Bell Telephone, at line stations.

When station personnel are too busy to answer a telephone, the machine is turned on. As soon as a call comes in, the machine automatically asks the caller to leave his telephone number, and advises that the call will be returned shortly. The machine will accommodate twenty 30-sec. messages on one magnetic, neoprene drum.

UAL installed the first of four experimental units Mar. 25.

▶**Dining Service**—United spokesman gave out some interesting statistics on their food service.

The airline served 4.5 million meals in 1953 at a cost of $5 million. Average price per meal was $1.29. This compares to an average of $1.36 per meal which was paid to caterers at small stations.

UAL operates 12 flight kitchens with 500 employes throughout the U. S. Busiest of these, Chicago, turns out 2,750 meals a day. Value of the equipment installed in the 12 kitchens is about $500,000.

A DC-6 carries 800 buffet pieces, valued at $1,700, a Boeing Stratocruiser

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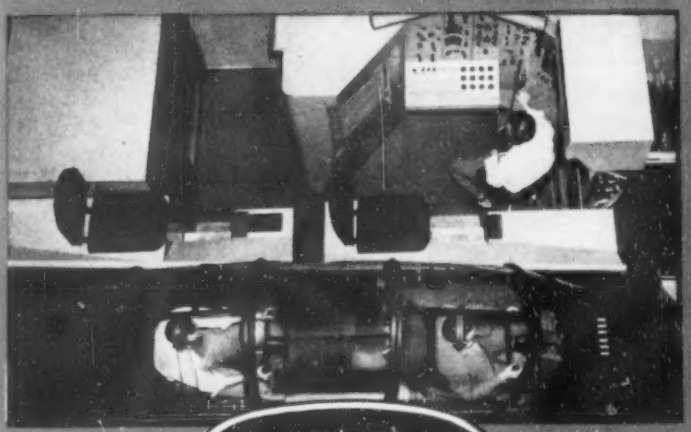

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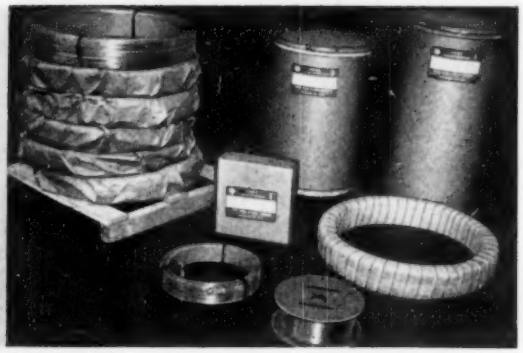

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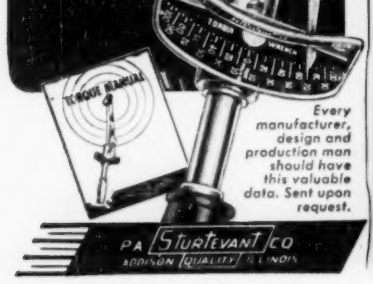

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carries 3,000 pieces, valued at $2,400. Total value of all buffet equipment at United is over $500,000.

▶**Passenger Relations**—United's Passenger Relations staff numbers 18 persons. Last year it sent out 12,700 individually typed letters and 11,500 form letters.

UAL settles 300 baggage damage claims a month. To reduce breakage and speed handling, UAL has installed a baggage room, complete with shelves, in the forward compartment of its DC-7s. Here, passenger luggage will be stored in its normal, upright position, which should reduce breakage to a minimum, the airline feels.

NEW AVIATION PRODUCTS

Air Drill Has Automatic Peck and Skip Features

Keller Tool Co. is introducing a new model in its Airfeedrill line that is said to be entirely automatic in operation.

Known as the Series 92A, the unit automatically advances, drills under accurately controlled conditions, retracts and shuts off.

It features a sensing-type advance that moves drill quickly to the work, then shifts to a preset drilling feed. When used in skip drilling, drill returns to rapid advance after each breakthrough.

Manufacturer says unit also provides automatic peck drilling which retracts drill as often as needed to clear flutes during work on deep holes. Speed of the air motor may be adjusted over wide range while maintaining full thrust. Motor also rotates on return stroke.

Drill can be furnished with either Jacobs chucks or Morse taper adapters, says the company. Stationary mounting adapters are available.

Units come in three basic sizes and 14 different models, with speeds from 250 to 15,000 rpm. and strokes from 2 in. to 7 in.

Keller Tool Co., Grand Haven, Mich.

Lightplane Hydraulic Pump Makes Compact Package

Romec Division of Lear, Inc., has designed a small hydraulic pump for personal aircraft and for emergency service in military and commercial systems.

Designated Model RG-10430, unit weighs only 5.5 lb., combining electric motor, rotary gear pump, pump adapter and radio noise filter into compact package. It displaces 0.5 gpm. at 1,000 psi.

Motor is rated at 0.44 hp., 26 v. d.c., 23 amp., and is explosion proof. It is rated for intermittent duty of 3 min-

"BOMBS AWAY"–the story of an R.A.F. bomber.

NO. 2 IN A SERIES ON THE AVRO VULCAN.

This historic photograph shows the three actual Avro 504's—the first bombers in the world to be fitted with mechanical bomb releases, lined up on Belfort aerodrome just before Sippe and his companions took off on their heroic raid.

Long Range Bombing...

Mission One, Nov. 1914

Morning—Nov. 21, 1914—It was 09.55 and very cold when Flight Lieutenant S. V. Sippe climbed into the cockpit of his Avro 504—the first bomber in the world to be fitted with mechanical bomb release. The place, Belfort aerodrome. The destination, Friedrichshafen. So Sippe and his two fellow pilots, Sqdn. Leader Briggs and Flt.-Cdr. Babington, set out in their tiny tri-formation to make history. For this was the first ever planned long distance bombing raid, a flight of some 250 miles over enemy territory to the German Zeppelin base on Lake Constance. The flight took Sippe all but four hours and only 11 bombs were dropped by the entire force. Yet with 80 h.p. motors, virtually no instruments and the added complication of a swinging detour round neutral Switzerland what a truly wonderful achievement this was . . . perhaps one of the most outstanding of many Avro "firsts" in aircraft history. Today Avro have yet another first, again in the realm of bombers—the mighty Avro Vulcan. Mr. Duncan Sandys, the Minister of Supply, and Air Chief Marshall Sir John W. Baker, Controller of Aircraft, Ministry of Supply, recently made a test flight in this revolutionary machine. After the flight the Minister said "We are all very much encouraged by the splendid performance of the Vulcan . . . the world's first Delta-shaped bomber. In test flights in the last few weeks, the Vulcan has shown its capability of more than meeting the exacting requirements in both height and speed laid down in the R.A.F. specifications of performance. For a large aircraft, it is also proving itself exceedingly manoeuvrable at high altitudes and speeds . . . and there is little doubt that the Vulcan still has quite a lot up its sleeve." Avro Vulcans are now in super-priority production for the Royal Air Force.

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utes on, 20 minutes off when pump is operating at the 1,000 psi. discharge pressure. On personal aircraft, it is reported to operate at 500 psi. with aircraft engine oil to actuate the propeller pitch.

Lear, Inc., Lear-Romec Division, Elyria, Ohio.

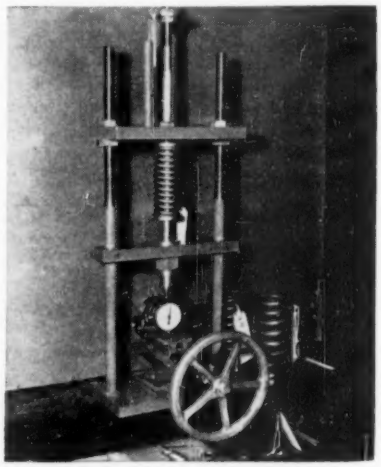
Plug Gage Kit Tells Size, Variation From Nominal

New plug gage kits consisting of 25 units—one in the nominal size, 12 which are progressively larger by .0001-in. increments, and 12 progressively smaller by the same increments—have been put on the market. The sets, known as Deltronic Tenth Plug Gages, are available in nominal sizes from $\frac{1}{8}$ in. to 1 in., in steps of $\frac{1}{64}$ in.

In using these gages, it is not necessary to purchase a separate unit for each tolerance, the manufacturer says, as each one is identified, showing size variation by ten-thousandths and is the same size on both ends to double the life in usage.

With this set, the user always has a gage that fits properly, requiring no adjustment. This eliminates necessity of investment in a set of go and no-go gages, notes the maker.

Deltronic Corp., 9010 Bellanca Ave., Los Angeles 45.



Spring Calibrator

A simple device for testing compression coil springs can be made out of available shop materials. Worked out by Farris Engineering Corp., Palisades Park, N. J., maker of precision safety and relief valves, the tester incorporates a W. C. Dillon mechanical pressure gage and a scissors or hydraulic jack. As the jack is extended, the coil is compressed and pressure is read off the gage. A fixed scale permits measurement of spring deflection. Various sizes of springs may be calibrated by using gages of appropriate pressure ranges.

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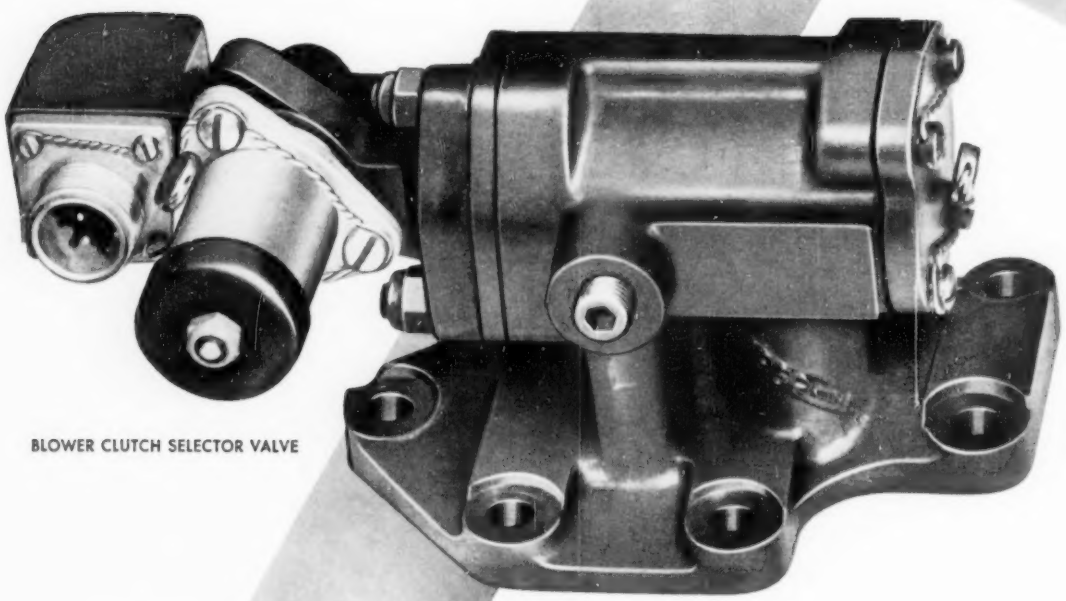

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ADEL

High Depreciation Cost Seen for Jet Liners

- **AA official says per-mile writeoff will double.**
- **But actual flight costs to be about same as DC-6.**

By Frank Shea, Jr.

Chicago—The major economic difference between coming jets and present piston-powered transports will be in depreciation charges, according to M. G. Beard, chief engineer for American Airlines.

Speaking at the second annual Air Safety Forum of the Air Line Pilots Assn. here last week, Beard said "these high-powered, fast transports with super-smooth wings and fuselage surfaces, powered with expensive engines and with high engineering development changes prorated over fewer units, are going to cost several times what the airlines paid for the DC-6 and Constellation."

▶**Double Depreciation**—"We have only estimated figures so far," Beard noted, "but the cost may be anywhere between $3.5 million and $4.5 million per airplane. The per-mile depreciation charges are about double those of the DC-6. This single item is so large in the total direct operating cost that it dominates the economy of the jet airplane."

On the other hand, Beard said the direct flight operation costs of jet transports compare favorably with those of the DC-6, even though crew pay scales and fuels are higher. He held that the jet's increased speed is sufficient to make the per-mile cost closely comparable to that of present transports.

▶**Special Treatment**—Direct maintenance costs should be somewhat lower, the airline engineer predicted. "Experience indicates that powerplant line maintenace may be very low compared to piston engines. Lack of vibration from engines and no aerodynamic propeller pulses relieve the airframe from much of the superficial structure and skin fatigue cracks commonly experienced on piston-powered transports.

"Jet stream pulses, however, do cause skin fatigue and require special treatment in certain areas. Overhaul of jet engines appears to be a simpler operation, but replacement part costs are high at the present time. The net effect seems to be for somewhat lower maintenance costs."

▶**Jet Designs**—Beard noted there are three jet-powered transports coming up in this country and one in England which, from economical aspects, could be operated at about the fare levels of present piston-powered planes.

The Boeing 707, Lockheed's 193 and the Douglas DC-8 in the U.S., and de Havilland's Comet in Britain all are designed around jet engine thrusts that will be available in about 1957 or 1958, said Beard, reporting that the economics of the designs are being evaluated with these future jet static thrusts and cruising powers in mind.

With regard to the three American models, Beard made the following observations:

- In general, all are designed around the same jet engines.
- Specific fuel consumption should be about .95 lb./hr./lb. for cruise at 85% rated rpm.
- Fuels probably will be kerosene or slightly heavier.
- The planes must carry 80 or more passengers with standard seating, which at a later date can be changed to high-density seating carrying 120 or more coach passengers.
- Payloads for domestic transcontinental nonstop operation will be between 28,000 and 30,000 lb., and the transports will be capable of carrying full payload on the west-bound transcontinental nonstop New York-San Francisco flight against 50-mph. headwinds.
- Gross weights will be between 175,000 and 200,000 lb. for this type of operation.
- Average cruising speed for the transcontinental nonstop flight at 40,000 ft. will be between 520 and 540 mph. On shorter trips, starting with lower gross weights, cruising speed at the same altitude will be about 550 mph.

Beard also forecast that jet transports will not require longer runways for domestic operation. All of the American models, he said, will operate out of 6,000-ft. runways on a standard day. Landing runway length requirements will be less, even without reverse jet thrust, he added.

▶**$50-Million Fleet**—Because of the high initial cost, limited nature of the service and the great amount of lift that each transport can provide, Beard does not look for domestic operators to buy many jet liners at first.

"At $3.5 million each, the investment with spares and overhaul tooling will run into about $50 million for 12 airplanes," he said, pointing out that "this is about half the net worth of any one of the larger airlines.

Beard added that "these jet transports must be safe, reliable, rugged and capable of high utility to pay off. The airlines must be reasonably sure that they will be before any such investment is committed."

▶**CAA Emphasis**—Additional highlights of the ALPA meeting included an address by Civil Aeronautics Administrator Fred B. Lee, who said CAA is placing special emphasis on irregular airline safety this year because the record among the nonskeds last year" was quite disappointing."

Steps for improvement include the opening of a C-46 school at Oklahoma City to teach the best operating practices to chief pilots of the nonskeds and tightened inspection procedures in the field of irregular and charter operations, Lee reported.

As to the controversy over the amendment of Part 40 of the Civil Air Regulations (AVIATION WEEK Apr. 26, p. 84), which determines the role of the pilots and flight engineers, he suggested that "we operate in accordance with it for a while and gain experience, rather than anticipate difficulties. When it has had a practical test, we can eliminate or change any portions which are found to require such action."

To advance the cause of safety, Lee said CAA is:

Jet vs. Piston Transport Costs

	DC-6 (1,500-mi. range, 300-mph. cruise speed)		80-passenger jet (2,500-mi. range, 550-mph. cruise speed) (Estimated average)	
Total flight operations (crew-fuel-oil-taxes-insurance)	54%	50.3 cents/mi.	43%	62.9 cents/mi.
Total flight equipment direct maintenance (airframe-engines-line-overhaul)	31	29.6	27	39.8
Depreciation (7 years)	15	13.9	30	43.6
	100%	93.8 cents/mi.	100%	146.3 cents/mi.

• Studying cockpit visibility requirements.

• Looking forward to more federally financed airport traffic towers to take care of increased air traffic control demands.

• Installing more surveillance radar.

• Modernizing the program of navigational ranges.

On the question of Tacan vs. VOR/DME, Lee said VOR now is fully implemented on the ground and, to a great extent, in the air. The DME is being implemented to an increasingly rapid rate in the air and the ground equipment is installed or on hand for imminent installation.

He added, however, that this does not mean disinterest in other techniques that may offer promise of improvement: "We are always on the alert for such developments."

▶ **Test Program**—Airborne radar also came in for considerable discussion. Carl Christenson, director of safety for United Air Lines, said airline management vitally is interested in acquiring airborne radar for modern flight operations.

He noted that UAL presently is evaluating its airborne radar test program in order to ascertain the merits of equipping its fleet in the near future.

"The only problem confronting the airlines today in respect to airborne radar installation is finding the necessary dollars," Christenson concluded.

▶ **Pilot Responsibility**—Fire protection, both in the air and on the ground, also was emphasized.

Capt. Vernon H. Brown, chairman of ALPA's Fire Hazard Study Committee, told the delegates: "We need pilot assistance and support if we are to have better emergency equipment on the aircraft and it will never be any better than we, or someone else, demands.

Pilots, he said, bear the responsibility of carefully monitoring and testing the various fire detection systems now in use. He urged pilots to use the basis of ALPA's air safety program—incident reports—to accumulate information for additional refinements of these systems.

▶ **Inadequate Equipment**—Jerome Lederer, director of the Flight Safety Foundation, said only a small percentage of civilian airports have adequate fire-fighting equipment and organization.

The high cost of bringing these systems up to par, he said, would force airlines to boost fares 10% to pay increased airport fees.

"The first avenue to improve fire-fighting organizations should be to make their job less formidable than it is now," Lederer declared.

To accomplish this, he suggested:

• Design the cockpit and cabin to give occupants a maximum chance of survival without injury in survivable type accidents.

• Design exits so they will not jam, can be opened from the outside, are easy to see by day or night, have locking mechanisms that are simple and natural to use, and are large enough not to require acrobatics to use.

• Design to reduce the chances of fire following impact and/or provide distance between the possible fire and the cabin.

Lederer emphasized this last item as of "utmost importance" to give more time for occupants to escape and for the crash crew to get to the crash site.

Considerable discussion also was devoted to cockpit procedures, meteorology and air traffic control problems. Approximately 60 pilot safety experts, industry specialists and government safety agents attended the forum.

PAA Answers Anti-Trust Suit

Last week, telling its side of the story for the first time, Pan American World Airways filed an answer to the Attorney General's anti-trust suit that seeks to divest PAA and W. R. Grace and Co. from control of Pan American-Grace Airways.

Divorce of Panagra from the Pan American system would result in increased and unnecessary government subsidies, PAA contended. The airline said, "Panagra has been an integral part of the Pan American Airways system for 25 years with the full knowledge and approval of the government and to the great benefit of the public."

▶ **Justice Approval**—The answer stated that 25 years ago former Attorney General Mitchell sustained a Panagra mail contract, granted by the Post Office with full knowledge of the joint ownership of the smaller airline by Pan American and Grace. This was done on May 6, 1929.

PAA cited numerous other cases where the facts, with respect to joint ownership of Panagra, were recognized and approved by the government. Typical case: In 1930, Pan American acquired ownership of New York, Rio and Buenos Aires Lines, Inc., upon the recommendation of the Postmaster General. The airline said this was done only after the Department of Justice gave assurances that there was no anti-trust law violation.

▶ **Full Knowledge**—Pan American pointed out that by 1931 the airline's system circling South America had been completed as a result of this purchase, and contracts for mail carriage had been awarded by the government with "full knowledge of the ownership facts."

The company further said that when the Civil Aeronautics Act went into effect in 1938, certificates of convenience and necessity were issued to both Panagra and Pan American in place of the mail contracts. "Again," said PAA, "there was no hint of any violation being involved."

Another instance cited was the government's authorization of a through-flight agreement in 1947, whereby Panagra equipment was chartered to PAA at the Canal Zone to provide through-plane passenger service between Buenos Aires and Miami by way of the West Coast. "Again," said PAA, "this was done with full knowledge of the facts of joint ownership of Panagra."

▶ **West Coast Lines**—Panagra was organized for the specific purpose of being the West Coast link in the PAA system of Latin American air routes, the Pan American answer claimed.

In addition, the company said Panagra has derived considerable benefit from its participation in the PAA system, including the advantages of 64 sales offices in Latin America and 171 others in the U. S. and other parts of the world. Panagra also employs Pan American maintenance, flight training and other technical facilities.

▶ **Revenues, Costs**—Holding that to divest PAA and Grace of control of Panagra would be contrary to the public interest, Pan American said such action would decrease Panagra's revenues and increase its costs.

The result would be an increase in the net costs of U. S.-flag air transportation generally, PAA added.

"Under the provisions of the Civil Aeronautics Act . . . for the subsidization of air carriers," the airline said, "this would require the government to pay added subsidies for the maintenance of U. S.-flag carriers abroad, thereby imposing increased and unnecessary burdens upon the government and the taxpayers in direct contravention of the policies which are currently being announced by responsible officers of the government." —FS

Board Considers New VFR Safety Tests

Civil Aeronautics Board is considering special visual flight rules designed to increase safety and efficiency of operations at high-density U. S. airports.

The special Civil Air Regulation would authorize Civil Aeronautics Administrator Fred B. Lee to designate Washington, D. C., as an experimental "high-density air traffic zone" for a one-year trial period. Lee would be permitted to prescribe additional rules for air traffic operating in VFR weather.

The proposed zone for VFR opera-

tions over Washington would extend to 3,000 ft. above National Airport and cover a five-mile ground radius. Additional extensions would be made 10 miles to the southwest in order to cover Mt. Vernon and two miles northwest to a point short of Riverdale, Md.

► **Additional Safety**—"Because of the reported congestion of traffic in the vicinity of certain large metropolitan airports," the Board says, "the increase in use of highspeed aircraft, the wide range of speeds in aircraft and the many different types of aircraft in use, it appears necessary to establish additional means of affording safety and efficiency in the movement of aircraft of all of the users of the airspace in such critical areas."

Establishment of such a traffic zone was recommended by a special working group of the Air Coordinating Committee, the Air Traffic Control and Navigation Panel. Aside from putting the idea to trial, ACC has recommended the following procedures for adoption by the CAA Administrator:

- Flights en route to an airport in the high-density control zone shall, prior to entering the zone, establish radio communication and maintain a continuous listening watch on the control tower serving that airport or the tower upon which the control zone is centered, if the destination airport is not served by a tower.
- Flights conducted from an airport in the high-density control zone served by a control tower shall maintain a continuous listening watch while within the high-density portion. Flights departing from a zone not served by a control tower shall establish radio communication and maintain a continuous watch on the appropriate frequency of the control tower serving the airport upon which the control zone is centered while the aircraft is within the high-density portion of the control zone.
- Control tower serving the zoned airport will be authorized to restrict VFR flight in the high-density area whenever the ground or flight visibility is less than three miles and the density of traffic requires restriction to effect safe separation between aircraft.
- No aircraft shall operate VFR within the high-density control zone with ground visibility of less than one mile, provided that where a local surface restriction to visibility exists—such as smoke, dust or blowing snow or sand—VFR flight may be conducted with ground visibility reduced to one-half mile if all turns after takeoff and prior to landing and all flight beyond a mile from the airport boundary can be accomplished above or outside the area.
- "Over" flights shall remain outside of the control zone.
- No aircraft shall be operated VFR in the high-density control zone in excess of 180 mph. indicated airspeed unless greater airspeeds are required for safe flight.
- High-density terminal control zones should be prominently marked and identified on all aeronautical charts.
- Considerable emphasis should be placed on the improvement of cockpit visibility.
- An educational program should be implemented that will call the attention of all pilots to the fact that lack of vigilance, combined with high-density traffic, are the major ingredients in a collision situation and that air traffic control during VFR conditions cannot eliminate collision hazards without full pilot cooperation.

► **AOPA Opposition**—Chief opponent to the plan is Aircraft Owners and Pilots Assn. The lightplane owners group maintains that such restrictions placed on all pilots are unnecessary. The preponderance of evidence shows clearly, AOPA contends, that collisions and near-misses are primarily due to the fact that pilots are flying into and through these high-density areas in a careless manner.

"Majority of the problems," says Max Karant, AOPA's assistant general manager, "would be solved if all pilots, without favoritism being shown were required to look where they are going at all times and especially in busy metropolitan areas."

He says AOPA repeatedly has taken the position that no such special regulations can eliminate such dangers so long as pilots are permitted to continue flying as they have been. Existing regulations, he says, properly ad-

Samoan Gets Permit

Secretary of the Interior Douglas McKay (center) presents a five-year operating certificate to Lawrence M. Coleman (left), president of Samoan Airlines. Richard Lowe, Governor of America Samoa, is at right. The airline is negotiating to buy two 22-passenger Convair PBY-5A Catalinas, which it plans to place in service on Samoa-Tahiti-Tonga-Canton-Fiji Islands flights—probably within four months.

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ministered and enforced, will deal adequately with the problem.

CAB has invited comments from the industry on the proposal, which must be received no later than May 26.

Colonial Merger

- **NAL says Eastern still controls smaller line.**
- **Board is asked to stop possible new agreement.**

National Airlines last week called on Civil Aeronautics Board to "quarantine" Eastern Air Lines and push a further investigation into the stock control that National contends EAL still has in Colonial Airlines.

Eastern denies having such control of Colonial (AVIATION WEEK Mar. 29, p. 60), the point on which President Eisenhower vetoed the EAL-CAI merger Feb. 27 (AVIATION WEEK Mar. 8, p. 51).

▶ **National Charges**—In its "petition for quarantine and intervention" filed with the Board last week, National contends that CAB's compliance attorney has found that Eastern still controls 51,115 shares or 9.9% of Colonial's outstanding stock.

NAL maintains this amount of stock is sufficient for control of Colonial. Sigmund Janas, onetime CAI president, held control of Colonial for eight years, says National, by owning less than 8% of its stock.

"Without extensive investigation into the new holders of the recently transferred Colonial stock," National argues, "there can be no assurance that the so-called 'divestitures' are anything more than paper transactions. The hocus-pocus of Eastern's alleged divestitures of the illegal control of Colonial . . . cannot be countenanced."

▶ **EAL, Strauss Control**—NAL claims Eastern accomplished the defeat of the original National-Colonial merger agreement and the approval of its own bid by means of its illegal control activities. The National-Colonial merger was disapproved by CAI's stockholders. Eastern's bid then was accepted.

"The evidence in the record conclusively established that (EAL president) Eddie Rickenbacker and Eastern joined forces with Janas in a connive to defeat the National-Colonial merger," National charges.

The Board's compliance attorney has found, that "no material change has taken place in the holdings of the Flumen Corp. and the Strauss family," NAL says. Furthermore, the investigation by the compliance attorney reveals that 354,803 shares of Colonial's stock are held in "street names"—investment and holding companies.

▶ **Holdings**—Eastern explained to CAB in March (AVIATION WEEK Mar. 29, p. 60) that Laurance S. Rockefeller, an EAL director who had held 26,200 Colonial shares, had sold them all when instructed to do so by Eastern's management Mar. 5. Adm. Lewis Strauss, present chairman of the Atomic Energy Commission, was a member of Flumen Corp., an investment company that serves as financial consultant to Rockefeller.

William J. McAuliffe, Jr., Board compliance attorney, said in his report to CAB that Eastern had reduced its holdings in Colonial from 110,500 to 41,415 shares. EAL reported Mar. 18 it still held 56,800 shares.

The attorney found that Adm. Strauss had sold his interest in Flumen Corp. to his son. Flumen, at the same time, reduced its Colonial holdings from 16,000 to 5,700 shares. However, Kuhn, Loeb & Co., a New York firm in which Strauss is a trustee, bought 4,000 shares of CAI stock Mar. 12.

▶ **New Agreement Seen**—Adding the Strauss holdings to those held by other interested individuals and companies, McAuliffe found that Eastern controlled 51,515 shares or 9.9% of the total 515,600 outstanding shares, as National claims.

Indications are that EAL is preparing to make a new agreement with Colonial for the acquisition of CAI's assets and to present such agreement to the Board for approval on the basis that Eastern has "purged itself of the violations of the act," according to National.

"If action is not forthcoming quickly by the Board, it appears that Eastern may again be able to confront the Board with another fait accompli in the form of an agreement with Colonial arrived at by virtue of Eastern's apparent willingness to pay any price (reasonable and otherwise) to gain control of Colonial and to prevent National from acquiring Colonial's assets," National says.

▶ **Bidding Contest**—Delay in deciding the issue of a National-Colonial merger, NAL maintains, can result only in a renewal of the bidding contest that has characterized this case over the past two and one-half years.

"The effect of Eastern's prior control is evidenced," the airline charges, "by the action of Colonial's management in its recent invitation for bids in which it rejected in advance any bid which did not offer to exchange common stock for Colonial's assets. The significant fact is that such an offer was in exact conformity with Eastern's prior offer and was a tacit rejection of National's prior offer of convertible debentures."

The merger case again rests with the Board. As yet, CAB has given no indication as to what action will be taken.

D.C. Airport Plan Too Costly: Airlines

Budget Bureau is reconsidering Commerce Department's proposed bill to incorporate Washington National Airport following the unfavorable reception the initial draft received from the 10 airlines affected.

All airlines, except American, indicated disapproval of the measure that nearly would double their costs at National Airport. Because of the majority's response when Civil Aeronautics Administrator Fred B. Lee presented the draft to them (AVIATION WEEK Apr. 12, p. 12), the bill was sent back to the Budget Bureau, which tentatively had approved the measure earlier.

▶ **Business Operation**—The airlines are the chief users of the airport's facilities and, as such, pay the bulk of revenue received at Washington National each year.

Chief argument for incorporation is that the airport would be handled, as Commerce Secretary Sinclair Weeks has said, "like a business . . . not like a government department normally is." Receipts would be turned back into the operation of the airport rather than to the Treasury Department, as is the case now.

The bill would transfer support of the airport from the taxpayer to airline users.

Commerce figures that the bill would add at least $700,000 annually to the $1,388,039 average revenue during the past five years.

▶ **Passage Uncertain**—Looking forward to sending the incorporation bill to Congress this session, Commerce did not ask for its annual airport appropriation for fiscal 1955, which begins July 1. However, present delays in drafting the bill, combined with Undersecretary of Commerce for Transportation Robert Murray's present unpopularity on Capitol Hill and late submission, make passage uncertain during this session of Congress.

It seems likely that a supplementary appropriation will have to be requested to run the airport during the upcoming fiscal year.

▶ **Seven-Member Board**—Washington National is the only government-operated civil airport in the U. S. It is run by CAA as are the airports at Fairbanks and Anchorage, Alaska. Under the incorporation bill, the field would be operated by Washington National Airport Corp. Management would be vested in the Commerce Secretary.

The bill calls for an advisory board composed of seven members appointed by the Secretary. An airport fund would be established in the U. S. Treasury, and capital would be advanced from appropriations made for that purpose

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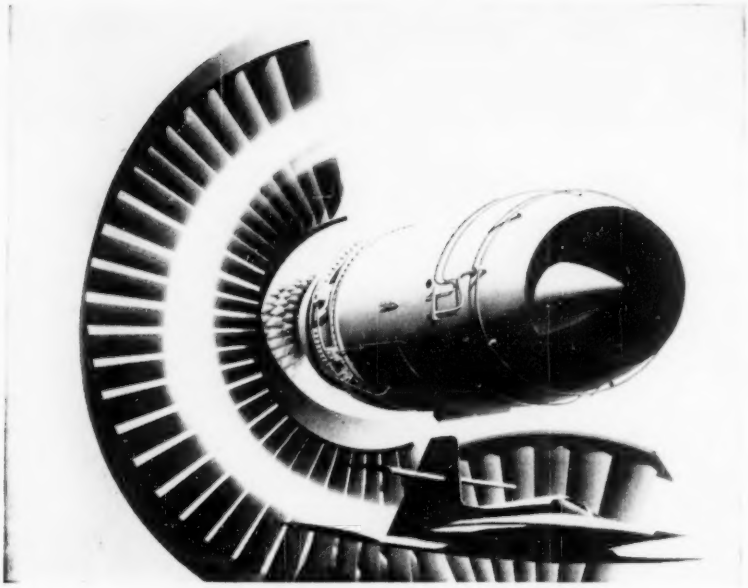

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The airlines using the airport would pay, in addition to rent of facilities used, an interest charge on the government's investment in the airport and an added charge to liquidate the investment on the unamortized balance. This would constitute doubling the present charges of the airline users, who now operate on a lease basis under which they pay for services rendered.

▶ **Leases Expire Soon**—American Airlines has approved the measure because it figures incorporation would give the users wider latitude in gaining new and more efficient facilities in the future.

Capital and Allegheny Airlines, both with headquarters at Washington National, are strongly opposed to incorporation. They reason the added cost of their operations at the airport would be prohibitive. Allegheny has suggested that it might consider moving its operations elsewhere.

Most airline leases at the airport expire next month. CAA Administrator Lee has suggested that the present leases be continued on a month-to-month basis until the legislation's fate is determined. Airlines generally do not favor such a move but realize they will have to go along with the agency that administers the airport.

▶ **Problems Cited**—Incorporating the airport would make the operation more flexible, Commerce believes, since it would not be restricted in its procurement and contracting to each year's appropriation.

The incorporation proposal is based on a Hoover Commission recommendation dated Mar. 31, 1949, which called for the change "so as to secure greater flexibility in management and simpler accounting, budgeting and auditing methods."

Except for its first few years of operation, Washington National Airport has been self-supporting. Since it was dedicated in 1940 by President Franklin D. Roosevelt, the airport has made a total profit of roughly $110,000 for the U. S. Treasury.

SHORTLINES

▶ **Colonial Airlines** will operate twice-weekly Constellation flights to Bermuda in cooperation with Ensign Tours and the St. George Hotel in Bermuda from May 26 to Oct. 28.

▶ **KLM Royal Dutch Airlines** is offering "heritage tours" during the summer travel season to Holland, Germany and France.

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Bids: June 8, 1954

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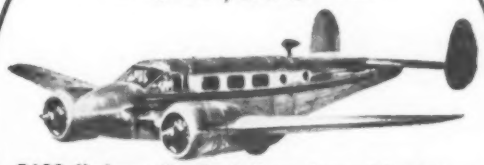

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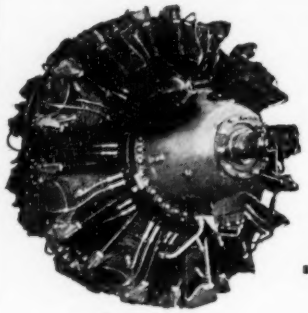

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Description	Mfg.	Part No.	Quan.
Pump	Pesco	1H-260K	195
Pump	Thompson	TFD8600	75
Cylinder Hyd.	Grumman	5359404	417
Heater	Surface Combustion Co.	83A9	6
Heater	Stewart Warner (200,000 BTU)	921B	230
Blower	Dynamic Air Engine	4582-AA-6C	18
Blower	Joy Manufacturing Co.	U-702-15	24
Tank Unit	Minn. Honeywell	G-1098D	11
Trim Tab Controller	Pioneer	15701-1A	15
Oil Cooler Assembly	U.A.P.	U8416-MM	12
Oil Cooler Assembly	U.A.P.	U8013-MM	14
Hydraulic Pump	Vickers	PF12-713-25BCE	124
Hydaulic Pump	Vickers	PF4-713-20BCE	327
Hydraulic Pump/ 3000 P.S.I.	Vickers	MF45-3911-20Z	43
Hydraulic Cylinder	Air Associates	HC2109	29
Hydraulic Cylinder	Air Associates	HC2110	8
Fire Detector	Edison	117-47	46
Fire Detector	CO_2 Mfg. Co.	ASDC2	65
CO_2 Cylinders	Kidde	981280	185
CO_2 Cylinders	Kidde	M870036B	47
Anti-Icer Pump	Adel	D7818	125
Auxiliary Power Unit	Eclipse	NEP-2	29
Auxiliary Power Unit	Lawrence	LER-30D	16
Pump	Pesco	1E-621	8
Pump	Pesco	2E258SA	21
Separator	Pesco	3V-217-HC	32
Accumulator	Vickers	AA14002A	35
Actuator	Air Associates	M-2031	22
Wobble Pump (D-3)	Erie Meter	AN4014	17
Oxygen Cyl.	Kidde	923748	74

ENGINE ACCESSORIES

Starter	Eclipse	1416-12E	75
Generator	Eclipse (NEA-3A)	716-3A	100
Starter Motor	Jack & Heinz	JH950-R	90
Generator	G.E.	2CM46A2	4
Generator	Eclipse	1003-4	71
Carburetor	Stromberg	PD12K10	550
Carburetor	Stromberg	PR48-A1	236
Carburetor	Holley	1685-HAR	90
Carburetor	Holley	1375-F	19
Magneto	Scintilla	SF9-LN-2	407
Fuel Pump	Pesco	2P248EB	6
Fuel Strainer	U.A.P.	U635A	76
Governor	Woodward	5x18	10
Prop. Reversing Control	Ham. Standard	72400	20
Oil Separator	Eclipse	564-2A	384
Oil Filter	Purolator	27314	100
Pressure Relief Valve	Aerotec	V301B7	20
Tachometer	Eclipse	2227-11-D3A	11
Vacuum Pump	Eclipse	610-2C	6
Spark Plugs	Aero	LS4-AD1	185,000

AIRCRAFT ENGINES & PARTS

Engine	Wright	R-1820-52	1
Engine	Wright	R-1820-54	16
Engine	Wright	R-1820-60	4
Engine	P & W	R-1830-43	1
Bearing	P & W	1045A	166
Flange	P & W	3506	500
Follower Assy.	P & W	8288	130
Blower Assy.	P & W	3M814	814
Shaft	P & W	48362	53
Shaft	P & W	48363	75
Gear	P & W	48461	390
Gear	P & W	76236	78
Bearing	P & W	84289	1178
Housing	P & W	84487	113
Nose Housing	P & W	84591C	77
Crankcase Assy.	P & W	84350-D	200
Pump Assy.	Wright Aero	420313	33
Drive Assy.	Wright Aero	416421	46
Q.E.C. Unit		FM1	36

AIRCRAFT ENGINES & PARTS (Contd.)

Description	Mfg.	Part No.	Quan.
Q.E.C. Unit		PY4M(B24)	17
Bearing	Torrington	NR6L12	25790
Bearing	Fafnir	AN200-K3L2	18273

GAUGES

Compass	Eclipse	36001-0	20
Gyro Indicator	Eclipse	14601-1F-B1	11
Gyro Indicator	Eclipse	10078-1AG	62
Position Indicator, Wheel & Flap	Weston	AN5780-2	400
Position Indicator, Wheel & Flap	G.E.	AN5780-2	1000
Position Indicator, Wheel & Flap	Eclipse	20100-11C-4-A1	23
Pitch Trim Gauge	Eclipse	15100-1B-A1	19
Cowl Flap Indicator	G.E.	8DJ29AAY	21
Oil Temp. Indicator	Lewis	77C3	23
Oil Temp. Indicator	Lewis	77C4	13
Oil Temp. Indicator	Weston	828TY13Z2	71
Manifold Pressure Gauge	Manning, Maxwell & Moore	AN5770-2	28
Fuel Quantity Gauge	Eclipse	3801-3B	128
Dual Carb. Temp. Gauge	Weston	828TY12Z2	40
Carb. Air Temp.	Lewis	77C3	22
Carb. Air Temp.	Weston	119862	40
Air Temp. Gauge	Weston	727TY70Z2	11
Air Temp. Gauge	Weston	727TY72Z2	85
Air Temp. Gauge	Weston	727TY73Z2	88
Air Temp. Gauge	Weston	727TY74Z2	83
Air Temp. Gauge	Weston	728-40Z2	10
Air Temp. Gauge	Weston	727-TY37P	298
Air Temp. Gauge	Lewis	47B22	33
Air Temp. Gauge	Lewis	47B23	18
Air Temp. Gauge	Lewis	47B24	54
Air Temp. Gauge	Lewis	47B21	30
Cylinder Head Temp.	Lewis	76B19	8
Torque Indicator	Eclipse	20100-42B-14A2	9
Tachometer Indicator	G.E.	8DJ13ABK	6
Tachometer Indicator	Eclipse	2222-1F-2A	200
Magnesyn Pos. Indicator	Eclipse	20000-8-A14	9
Magnesyn Transmitter	Eclipse	20000-43A-13A1	8
Magnesyn Indicator	Eclipse	23000-2A	67
Pressure Transmitter	Eclipse	22101-11-A4	15
Pressure Transmitter	Giannini	47114-D2.0-20	8
Differential Pressure Gauge	Kollsman	906-6-011	22
Differential Pressure Gauge	Kollsman	254BK-6-052	48

AIRCRAFT (RADIO)

Transmitter	Bendix Radio	TA-12B	20
Receiver	Bendix Radio	RA10-DB	35
Amplifier (PB10) W/ED$_2$ Mount	Eclipse	15401-1	10
Amplifier	Eclipse	12086-1C	11
Radio Noise Filter	G.E.	1C-200	740
Radio Noise Filter	G.E.	NF10084	959
Tube		JAN6AL5	327
Standing Wave Ind.	Hewlett Packard	415A	3
Antenna Switch	Bendix Radio	MS49A	26
Control	Bendix Radio	3616	81
Station Box	Bendix Radio	3620	23
Insulator	Bendix Radio	MT48C	518

ELECTRICAL PARTS

Plug	CAKZ	UG-21/U	1979
Transformer	Eclipse	DW33	11
Transformer	Eclipse	DW28	80
Transformer	Eclipse	DW47	33
Transformer	G.E.	70G3	26
Servo Motor	Transicoil	#1300-20	57
Motor	G.E.	5BA40NJ1A	425
Motor	G.E.	5DP65-MB1	189
Motor	G.E.	5BA25D-J4B	44
Motor	Airesearch	26675	25
Motor	Diehl	FD65-5	21
Circuit Breaker	Spencer	PM-5	2994
Valve	Parker	AN5831-1	60
Valve	Eclipse	612-4A	130
Valve	Kohler	K1593-6D	1288
Valve (0-500PSI)	Bendix	146102	46

ELECTRICAL PARTS (Contd.)

Description	Mfg.	Part No.	Quan.
Circuit Breaker	Spencer	C6363-1-5A	115
Circuit Breaker	Spencer	C6363-1-2A	115
Circuit Breaker	Heinemann	AM1614-80	1700
Circuit Breaker	Cutler Hammer	6141-H69A	237
Amplidyne	G.E.	5AM31JJ9A	31
Amplidyne	G.E.	5AM31NJ10	111
Switch	Kidde	A-4614	151
Ignition Switch	Scintilla	AN3213-1	70
Ignition Switch	Nesco	A-9(94-3226)	250
Master Switch	Jos Pollack	M862A	86
Thermo Switch	Fenwall	17322-2	126
Heater Control Switch	White-Rodgers	1033-4E1	287
Air Ram Switch	Minn. Honeywell	PG208AS1	148
Air Ram Switch	Minn. Honeywell	PG208AS7	40
Pressure Switch	Aerotec	M-101-B	20
Pressure Switch	Eclipse	3135-11C	88
Impact Switch	Kidde	SA/3A	18
Switch	C.H.	8909-K99	2000
Dome Light	Grimes	AN3096-4	2585
Dome Light	Grimes	AN3096-5	775
Dome Light	Grimes	AN3096-6	1365
Plug	Cannon	NAF310310-4B	2747
Plug	Cannon	NAF310310-5B	402
Relay	Leach	7264-404	47
Relay	Leach	7210	24
Relay	Allied	BOBX-2	31
Relay	Square D	82A	718
Relay	G.E.	CR2791-G100-K4	281
Relay	G.E.	CR2792F101-A3	626
Relay	Guardian	G34464	41
Relay	Guardian	G31502-A	350
Relay	C. P. Clare	D2060	45
Control Box	Vapor Car Heating Co.	9804B	34
Compensator	Vapor Car Heating Co.	46B311	25
Solenoid	Interstate Aircraft & Eng. Co.	A812	202
Flex. Cable	Airesearch	25432	66
Temp. Control	Fulton Syphon	715E	52
Noise Filter	Mallory	NF3-5	500
Regulator	G.E.	3GBD1A18A	13

VALVES

Valve	Kidde	982585	326
Valve	Oh. Chem.	AN-60009-1B	325
Valve (3000 PSI)	Parker	2-1046-76	47
Restrictor Valve	Parker	SP4-2746-77	68
Restrictor Valve	Parker	SP4-2746-78	105
Restrictor Valve	Parker	SP4-2746-79	40
Restrictor Valve	Parker	SP4-2746-80	48
Restrictor Valve	Parker	SP4-2746-81	60
Restrictor Valve	Parker	SP4-2746-76	142
Restrictor Valve	Adel	18784	33
Cone Check Valve	Parker	PL2-2546-75	127
Cone Check Valve	Parker	PL2-2546-76	123
Cone Check Valve	Parker	PL2-2546-77	620
Cone Check Valve	Parker	PL2-2546-78	540
Check Valve	Parker	PLY-843-54	112
Check Valve	Parker	PL2-1846-77	23
Check Valve	Kenyon	19100-2-101B	67
Check Valve	Eclipse	557-5	9
Check Valve	U. S. Gauge	AW-CV-1-1	180
Valve	Parker	6-746-10	68
Valve	Vickers	AA31400	28
Restrictor Valve	Adel	18784	33
Lock Valve	Adel	12924-2	85
Brake Valve	Vickers	146102	22
Selector Valve	Parker	SP-1-445-8	7
Selector Valve	Adel	D9530	478
Selector Valve	Adel	D9530-2	668
Selector Valve	Adel	D9560-2	478
Selector Valve	Adel	D9632	179
Selector Valve	Adel	D9696	237
Selector Valve	Adel	D10044	744
Selector Valve	Adel	D10051	244
Solenoid Valve	United	37D6210 (AN4078-1)	2200
Magnetic Valve	General Control	AV1B1174	114
Throttling Valve		73-A-01	1865
Relief Valve	Airex	1265-900	240
Pressure Relief Valve	Aerotec	V301B7	20
Valve	Aero Supply	74247 (TyPH3)	814
Valve	Whittaker	AN5830-1	335
Valve	Whittaker	AN5830-6	74
Underwing Fueling Valve	Parker	7-2646-12	5
Disconnect Valve	Allen	5QD1800N	148
Drop Tank Valve	Allen	8QD1800B	53
Disconnect Coupling	Allen	38QD1800B	60

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News Sidelights

Japan's airpower goal has been set at 1,300 planes, including 500 F-86 Sabre jet fighters, 100 twin-jet bombers, 100 cargo planes and the remainder photorecon, liaison and trainer aircraft, according to press reports. Target date: 1957, but more probably considerably later.

Qantas Empire Airways (Australia) plans to enter the fight to make Los Angeles a co-terminal with San Francisco for foreign airlines terminating on the West Coast. Little has been said about it, but the Los Angeles fight with State Department for terminal status is being opposed quietly by U.S. air carriers.

Georges Fevrier, president of the French Aviation Writers Assn., says the two French civil aviation projects holding greatest promise are the Avions Hurel-Dubois H.D. 45 and H.D. 32. The H.D. 45, a twin-jet, is scheduled for flight test the end of this year, he says. The twin-engine, propeller-driven H.D. 32 is a thin-wing cargo plane convertible to passenger use.

Western Air Lines says its 1954 "diamond airlift" will be the largest in the history of organized baseball. Pacific Coast League has scheduled an all-time record number of flights, the airline reports.

Continental Aviation & Engineering Corp. has been awarded a production contract for the Air Force's J69 gas turbine (French Turbomeca Marbore being built in U.S. under license). The 880-lb.-thrust J69 will be used in target drones being produced by Ryan Aeronautical Co. Contract is reported to total $2 million. Tooling will start soon and production is expected by October.

Easter had a double meaning for British European Airways this year. In addition to the holiday, it marked the first anniversary of inauguration of turboprop-powered Vickers Viscounts in scheduled service. Company's fleet of 20 Viscounts has flown more than 6,000 passengers nearly 300,000 mi.

USAF discovered it had paid too much to Los Angeles County for the Palmdale Airport. Price was more than $1.2 million. Rebate demand was to cover the fee for recording a quit claim deed which Air Force forgot to deduct. Amount : $2.

Trans World Airlines got mixed up with monkeys recently, was temporarily in the business of selling pig-tailed macaques. A shipment of eight monkeys from India was turned down by the consignee, a pet shop, who refused to pay the $330 freight bill. The simians were placed in the zoo at Kansas City, offered for sale for $45 each. Bids came from Florida to Spokane, Wash.

OLD SOLDIERS NEVER DIE—These four rebuilt World War I combat planes, predecessors to today's supersonic fighters, are part of Paul Mantz' "air force" which he has assembled for exhibition and movie purposes. From left to right: French Nieuport and Spad fighters, German Fokker D-7 fighter and de Havilland-designed, Boeing-built DH-4. In front of the planes are Paul Mantz (left) and pilot Bill Boone. The planes are based at Orange County Airport near Santa Ana, Calif.

AVIATION CALENDAR

May 5-7—Third International Aviation Trade Show, managed by Aircraft Trade Shows, Inc., 71st Regiment Armory, New York.

May 6-8—Institute of the Aeronautical Sciences, first annual West Coast Industry-Faculty Conference and fourth annual Student Conference, Los Angeles.

May 7-8—National Intercollegiate Flying Assn., annual Spring Flying Meet, University of Illinois, Urbana, Ill.

May 10-12—Institute of Radio Engineers, National Conference on Airborne Electronics, Biltmore Hotel, Dayton, Ohio.

May 10-13—Society of Aeronautical Weight Engineers, 11th annual conference, Lord Baltimore Hotel, Baltimore.

May 11—Daniel Guggenheim Medal Board of Award, annual meeting for preliminary selection of 1954 candidates, Engineering Society Building, New York.

May 14-17—American Volunteer Group (Flying Tigers), biennial reunion, Belmont Plaza Hotel, New York.

May 16-19—American Association of Airport Executives, convention, Louisville, Ky.

May 17-18—National Fire Protection Assn., Aviation Seminar, Hotel Statler, Washington, D. C.

May 17-20—Basic Materials Exposition and Conference, International Amphitheater, Chicago.

May 20—Women's National Aeronautics Assn., 1954 Skylady Derby, Raton, N. M. to Kansas City, Mo.

May 21-22—Operations Research Society of America, second annual meeting, Edgewater Beach Hotel, Chicago.

May 21-23—Texas Private Fliers Assn., state convention, Galvez Hotel, Galveston.

May 24-26—National Telemetering and Remote Control Conference, sponsored by IRE, AIEE, IAS and ISA, Morrison Hotel, Chicago.

May 31-June 11—Canadian International Trade Fair, to be held in conjunction with the National Air Show and Canada's Aviation Day, Toronto.

June 2-4—Triennial industry inspection of NACA's Lewis Flight Propulsion Laboratory, Cleveland, Ohio.

June 5—Fifth annual Maintenance and Operations Clinic, sponsored by Reading Aviation Service, Inc., Reading Municipal Airport, Reading, Pa.

June 5-12—Philadelphia Junior Chamber of Commerce, second annual Transcontinental Air Cruise, Philadelphia to Palm Springs, Calif.

June 18-19—Britain's National Air Races, sponsored by Royal Aero Club, Bagington Aerodrome, Coventry, England: International Trophy Race, June 18; King's Cup Air Race, June 19.

June 21-24—Institute of the Aeronautical Sciences, annual summer meeting, IAS Building, Los Angeles.

June 24-26—American Helicopter Society, 10th annual forum, Washington, D. C.

July 3-6—Eighth annual All-Woman Transcontinental Air Race, sponsored by Ninety-Nines, Inc., Long Beach, Calif., to Knoxville, Tenn.

Sept. 4-6—National Aircraft Show, Dayton, Ohio.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—MAY 3, 1954

ADEL DIV., GENERAL METALS CORP. 74
Agency—The McCarty Company
AIRBORNE ACCESSORIES CORP. 56
Agency—Gray & Rogers Adv.
AIRCRAFT RADIO CORP. 8
Agency—Burke Dowling Adams, Inc.
ALLISON DIV., G. M. C. ..... Fourth Cover
Agency—Kudner Agency, Inc.
AMC SUPPLY DIV. OF AIR ACCESSORIES, INC. .. 70
Agency—Parker Willson Adv.
AMERICAN CHAIN & CABLE, PAGE STEEL & WIRE DIV. 70
Agency—Reincke, Meyer & Finn, Inc.
AMERICAN ELECTRONICS MFG., INC. 25
Agency—Clyde D. Graham Adv.

B & H INSTRUMENT CO. 26
Agency—The Kotula Company
B. H. AIRCRAFT CO., INC. 58
Agency—Harold Marshall Adv. Co.
BARBER COLMAN CO. 67
Agency—Howard H. Monk & Assoc.
BERG INDUSTRIES 8
BRISTOL COMPANY, THE 6
Agency—James Thomas Chirurg Co.

CONSOLIDATED VULTEE AIRCRAFT CORP. 66
Agency—Thomas L. Yates Adv. Agency
CONTINENTAL MOTORS CORP. 34
Agency—Cummings & Hopkins Adv.
COOPER PRECISION PRODUCTS, INC. 29
Agency—Sudler Company, Advertising

DARNELL CORP., LTD. 61
Agency—Henry L. Rhea Adv.
DOUGLAS AIRCRAFT CO. 10
Agency—J. Walter Thompson Co.

ELECTRICAL ENGINEERING & MFG. CORP. 32, 33
Agency—West-Marquis, Inc.
ESSO STANDARD OIL CO. 38
Agency—McCann-Erickson, Inc.

FAIRCHILD ENGINE & AIRPLANE CORP. 57
Agency—Gaynor & Co., Inc.
FEDERAL TELEPHONE & RADIO CO. 35
Agency—J. M. Mathes, Inc.

GARRETT CORP., AIRESEARCH MFG. CO. 26
Agency—J. Walter Thompson Co.
GILFILLAN BROS., INC. 5
Agency—Erwin, Wasey & Co.
GOODRICH CO., B. F. 3
Agency—Batten, Barton, Durstine & Osborn, Inc.
GRUMMAN AIRCRAFT ENGINEERING CORP. 68
Agency—Fuller & Smith & Ross, Inc.

HARDMAN TOOL & ENGINEERING CO. 49
Agency—The Essig Company
HARVEY ALUMINUM SALES, INC. ..... Third Cover
Agency—Hixson & Jorgensen, Inc.
HI-SHEAR RIVET TOOL CO. 77
HYDRO-AIRE, INC. ..... Second Cover
Agency—Roy S. Durstine Adv.

IRON FIREMAN MFG., CO. 28
Agency—Joseph R. Gerber Co.

KAMAN AIRCRAFT CORP. 69
Agency—Charles Palm & Co.
KETAY MANUFACTURING CORP. 19, 20
Agency—Hicks & Greist, Inc.

LINK AVIATION, INC. 69
Agency—Gaynor & Co., Inc.
LOCKHEED AIRCRAFT CORP. 79
Agency—Hal Stebbins Adv.
LORD MFG. CO. 55
Agency—Davies & McKinney Adv.

MANNING, MAXWELL & MOORE, INC. 22
Agency—Fuller & Smith & Ross, Inc.
McCULLOCH MOTORS CORP. 24
Agency—Stromberger, LaVerne, McKenzie Adv.
MINNEAPOLIS HONEYWELL REGULATOR CO. ..... Front Cover
Agency—Foote, Cone & Belding
MINNESOTA MINING & MFG. CO. 31
Agency—Batten, Barton, Durstine & Osborn, Inc.

NATIONAL AERONAUTICAL CORP. 42
Agency—Davis, Parsons, Stromeier, Inc.

O. K. TOOL CO., THE 65
Agency—Peck Brothers Adv.
OSTER MFG. CO., JOHN 72
Agency—Henri, Hurst & McDonald, Inc.

PACIFIC AIRMOTIVE CORP. 59
Agency—Buchanan & Co., Inc.
PARKER APPLIANCE CO. 52, 53
Agency—Fuller & Smith & Ross, Inc.
PRATT & WHITNEY AIRCRAFT DIV., UNITED AIRCRAFT CORP. 40, 41
Agency—Lennen & Newell, Inc.

RADIO CORP. OF AMERICA 51
Agency—Al Paul Lefton Co., Inc.
REID ENTERPRISES 78
Agency—Dick Donald Advertising
RELIANT INDUSTRIES 62
RIVERSIDE METAL CO. 48
Agency—Robert S. Kampmann, Jr.
ROEBLING'S SONS CO., JOHN A. 4
Agency—Beatty & Oliver, Inc.
ROE COMPANY LIMITED, A. V. 71
Agency—Dolan, Davis, Whitcombe & Stewart Ltd.
RYERSON & SON, INC. 50
Agency—Aubrey, Finlay, Morley & Hodgson, Inc.

SCINTILLA MAGNETO DIV., BENDIX AVIATION CORP. 73
Agency—MacManus, John & Adams, Inc.
SEARCHLIGHT SECTION ... 81, 82, 83, 84, 85, 86, 87
SENSENICH CORP. 78
Agency—Foltz-Wessinger, Inc.
SHELL CHEMICAL CORP. 63
Agency—J. Walter Thompson Co.
STURTEVANT CO., P. A. 70
Agency—Ross Llewellyn, Inc.

TOWNSEND COMPANY 27
Agency—Bond & Starr, Inc.
TWIN COACH CO. 45
Agency—Palm & Patterson, Inc.

VAPOR BLAST MFG., CO. 62
Agency—Morrison-Greene-Seymour, Inc.
VERSON ALLSTEEL PRESS CO. 60
Agency—Russell T. Gray, Inc.

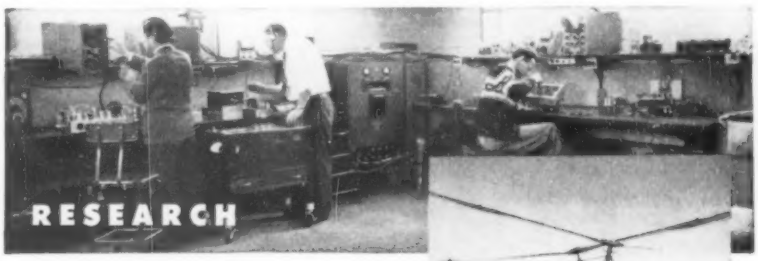
WARNER DIV., DETROIT HARVESTER CO. 23
Agency—Clark & Roberts, Inc.
WESTERN AIR LINES, INC. 39
Agency—Buchanan & Co., Inc.
WESTINGHOUSE ELECTRIC CORP. 46, 47, 80
Agency—Fuller & Smith & Ross, Inc.
WHITTAKER CO., LTD., WM. R. 37
Agency—Mogge Privett, Inc.

SEARCHLIGHT SECTION

(Classified Advertising)

H. E. Hilty, Mgr.

EMPLOYMENT
Positions Vacant 81-85
Selling Opportunities Offered 82
Positions Wanted 84
Selling Opportunities Wanted 84
Employment Agencies 84
Employment Services 84
SPECIAL SERVICES
To the Industry 84
PROPERTY
For Rent 84
PLANES—EQUIPMENT
(Used or Surplus New)
For Sale 84-87
WANTED
Planes—Equipment 84



DEVELOPMENT

PRODUCTION

To design and develop such outstanding helicopters as the HTK-1 and the HOK-1, Kaman Aircraft has assembled a complete engineering staff skilled in the fields of mechanical design, electronics, aerodynamics with special emphasis on the development and production of electro-mechanical devices and systems. Moreover, the production of Kaman helicopters requires large plant facilities and an impressive inventory of machine tools and equipment from the smallest electronics part to presses of huge capacity. Each contributes to Kaman Performance, and . . .

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KAMAN

EDITORIAL

Great Untapped Markets

Whenever we are tempted to get enamored of the constantly increasing air passenger figures—into the millions—on the nation's airlines, we need a dousing in other cold statistics to shake off complacency.

United Air Lines has come up with survey results, probably typical of industry patronage generally, that show how far we have to go yet to capture two big travel markets. Every real salesman will see the significance of these two findings by United:

1. Seventy percent of its total passenger list are men.
2. Sixty percent of its clientele travel on business.

The markets for women passengers and non-business travel are enormous. Not to mention millions who travel for any reason by surface transportation.

Now They're Practically Here

Only a few weeks ago on this page ("The British Are Coming") we warned that, after Civil Aeronautics Board for nearly seven years has been pigeon-holing or refusing applications from U. S. companies which wanted to start unsubsidized all-cargo services across the North Atlantic, a British competitor in 1953 had requested similar rights and might well win them quickly.

Sure enough, Airwork, Ltd., of Great Britain has been granted its certificate by CAB for unsubsidized cargo services. Still, no U. S. firm has been given equal rights by our own federal government. The British not only are coming. They are practically here. Is this to be another version of offshore procurement?

Detroit's Charm of Quaintness

If you have ever been compelled to use Willow Run Airport, which is somewhere in the same state as Detroit, you would enjoy a series of editorials in the Detroit Free Press.

Detroit is not the sole offender among America's great cities that tolerate distant or inadequate airports, and the Free Press' whimsical ridicule would find interested readers throughout the country.

"San Francisco, Chicago, Cleveland, St. Louis, Fort Worth and Pittsburgh all currently are improving their airport facilities, or have recently completed major improvements," one of the editorials tells the Detroit readers.

"They're going to regret this. It's like letting railroads build stations in a town. The first thing you know a lot of people, many of them unvouched-for strangers, are coming and going. And that's the least of it. The stuff you manufacture gets shipped away, and a lot of other stuff gets shipped in. It makes for brisk business, of course, but this appeals only to a sordid element in the population which sees no beauty in a grass-grown street.

"You can bet if the railroads wanted to put their old stations here in Detroit today, all of the right thinking people would be up in arms about it. They were sneaked in years ago under a variety of shabby pretexts.

"Others may advantage themselves by recognizing progress if they choose. Detroit prefers to rest its transportation case on the charms of quaintness.

"Milwaukee, the old spendthrift, is blowing $3 million on a new terminal building at its airport, and bettering the field from an operating standpoint too. . . . Milwaukee says it intends to be on the main line of tomorrow's skyways.

"This is a brazen admission of commercial aspiration. Milwaukee says in so many words that it wants to elbow its way in among those towns that accept modern transportation methods as a means to lure business their way.

"Rightly, Detroit regards this as painfully crass. Detroit is the reserved, dignified kind that wouldn't think of exploiting tomorrow's air transportation advantages. We don't even exploit today's.

"If somebody wants to get here by airplane badly enough, he can portage in from Ypsilanti—and good enough for him it is. Anything we may lose is more than offset by the maintenance of a pride which scorns the antics of towns like Milwaukee, where they're always thinking in terms of what's good business and how about tomorrow."

We Can't Afford a Soaring Team?

We are the wealthiest nation in the world, and our aviation industry is the greatest. But the Soaring Society of America is still far from assured of a minimum $15,000 needed to send an American team to the only international aviation competition still alive.

At least 17 other countries already have managed to unearth necessary funds, however—even little Denmark and Finland—and more are expected.

Britain is host this year to the international soaring and gliding meeting, set for July 20 to Aug. 4.

The $15,000 will be used only for transportation of 18 men and a few sailplanes between New York and the contest site, and for rented cars during the meeting. All other costs are to be borne by the team members themselves!

"Many feel that this support should come from the aviation and associated industries, since the prestige of U. S. aviation is involved to some degree," Paul A. Schweizer, secretary of the Soaring Society, writes in an appeal, "and also since the industry and the country as a whole can benefit by encouraging an activity that has great potential as the basis for an appealing youth aviation program."

U. S. private flying and youth aviation interest are in the doldrums (so is the Air Force enlistment rate), yet year after year sports flying seeks virtually nothing from the aviation industry.

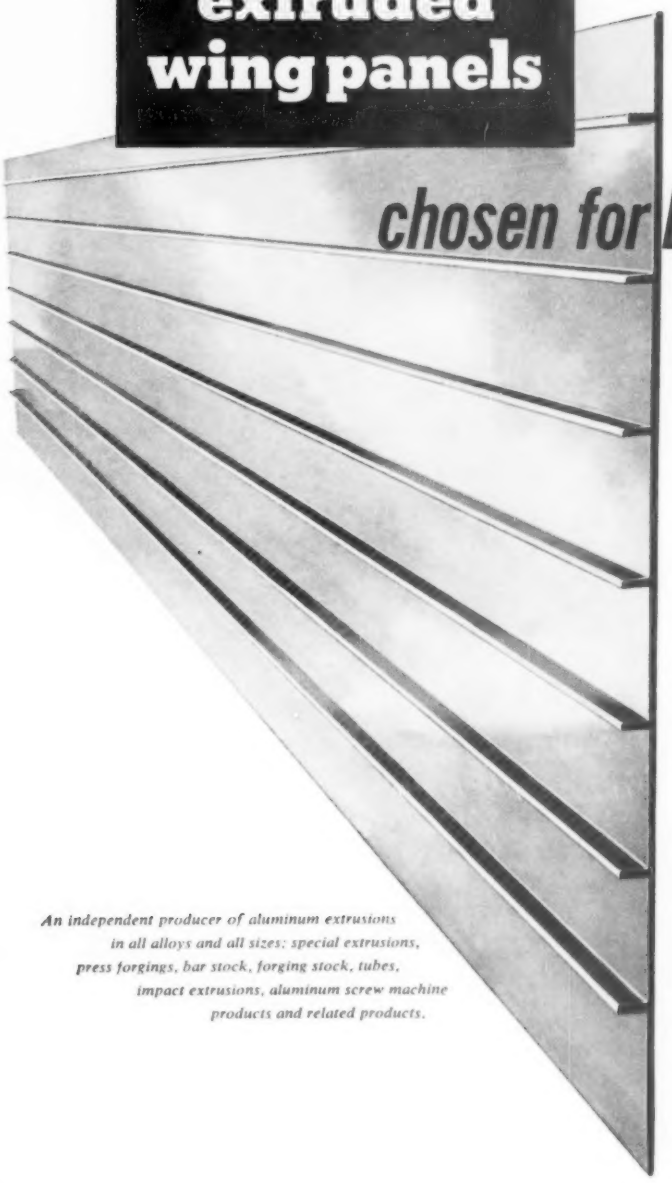
These soaring enthusiasts receive not a penny in federal subsidies. All contributions to Soaring Society of America, Inc. are tax exempt. There probably are few better ways in aviation to stretch your dollar than by contributing to this project. You can send your offering to Mr. Schweizer, in care of the association at Elmira, N. Y. It would be incredible if we couldn't "afford" American representation at this year's contest.

—Robert H. Wood

Lightweight rigidity of

Harvey aluminum extruded wing panels

chosen for Lockheed XFV-1



Progressive aircraft engineering, exemplified by Lockheed's sensational new vertical takeoff fighter plane, means producing for tomorrow's needs today. Progressive aluminum engineering made it possible for Harvey to extrude extra wide, integrally stiffened wing panels for this fighter plane of the future. In addition to their great strength, these extruded aluminum wing panels mean substantial savings in machining and fabricating costs. This example is typical of what can be done with the many advanced extrusion techniques and modern equipment available at Harvey. You'll find it pays to deal with Harvey, the world's largest independent producer of aluminum extrusions.

An independent producer of aluminum extrusions in all alloys and all sizes: special extrusions, press forgings, bar stock, forging stock, tubes, impact extrusions, aluminum screw machine products and related products.

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NEW WATER-BASED AIRCRAFT

FASTEST IN HISTORY

Allison T40 Turbo-Prop engines give Navy's R3Y a top speed of more than 300 knots—enable take-off with full load in 30 seconds

A NEW era in global air transport may well have been inaugurated when Convair's new R3Y "Tradewind" successfully completed its initial test flight off San Diego Bay recently.

For this slim-hulled craft has been hailed as the "fastest big seaplane in aviation history," designed to carry high pay loads long distances at nearly double the speed of previous water-based transport aircraft.

Four Allison T40 Turbo-Prop engines, each developing more than 5500 horsepower, give this 80-ton water-based transport a speed of better than 300 knots—with power to take off with full pay load in approximately 30 seconds. Propellers are Aeroproducts contrarotating, fully reversible which permit unlimited maneuvering and braking.

Scheduled to enter transpacific Navy service this year, the R3Y's now in production reflect the Bureau of Aeronautics' steadfast faith in the potential of Turbo-Prop power; Consolidated Vultee's latest accomplishment in its long-range program of pioneering water-based aircraft; and Allison leadership in Turbo-Prop development, in cooperation with both the Military Services and airframe builders.

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